UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

February 27, 2004

Magalie Roman Salas, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

RE: Biological Opinion for ESA Section 7 Consultation for Cushman Hydroelectric Project (FERC No. 460). NOAA Fisheries Consultation No. F/NWR/2000/00828.

Dear Secretary Salas:

Enclosed is the Biological Opinion prepared by the National Marine Fisheries Service (NOAA Fisheries) on the Federal Energy Regulatory Commission's (FERC) proposed license for the operation of the Cushman Hydroelectric Project (FERC No. 460). This document represents NOAA Fisheries' biological opinion of the effects of the proposed action on listed species in accordance with Section 7 of the Endangered Species Act of 1973 as amended (16 USC 1531 *et seq.*), in response to your June 9, 2000, letter requesting consultation and Biological Assessment.

In this Biological Opinion, NOAA Fisheries has determined that the proposed action is not likely to jeopardize the continued existence of Puget Sound chinook salmon and Hood Canal summer chum salmon.

In addition to the Biological Opinion, enclosed as section 11 is a consultation regarding essential fish habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267). NOAA Fisheries finds that the proposed action will adversely affect EFH for chinook and chum salmon and recommends that the Terms and Conditions of section 9 of the biological opinion be adopted as EFH conservation measures. Pursuant to MSA (§305(b)(4)(B) and 50 CFR 6000.920(j), Federal agencies are required to provide a written response to NOAA Fisheries' EFH conservation recommendations within 30 days of receipt of these recommendations.

This Biological Opinion is responsive to the comments FERC and NOAA Fisheries received on our draft Biological Opinion which was filed with FERC on December 1, 2003.

Comments or questions regarding this Biological Opinion and MSA consultation can be directed to Steve Fransen of the NOAA Fisheries Hydro Program at 360/753-6038, or email steven.m.fransen@noaa.gov.

Sincerely,

D. Robert Lohn
Regional Administrator

Enclosure

cc. Original & 8 Copies to the Secretary
FERC Service List

Endangered Species Act
Section 7(a)(2) Consultation

Biological Opinion

and

Magnuson-Stevens Fishery Conservation and Management Act Consultation

Issuance of a License to operate the
Cushman Hydroelectric Project
FERC Project No. 460
located on the North Fork Skokomish River
Mason County, Washington

Action Agency:	Federal Energy Regulatory Commission
Consultation Conducted by:	NOAA Fisheries Northwest Region Hydropower Division
NOAA Fisheries Log Number:	F/NWR/2000/00828
Date:	February 27, 2004

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1. INTRODUCTION

The Endangered Species Act (ESA) of 1973 (16 USC 1531-1544), as amended, establishes a national program for the conservation of threatened and endangered species of fish, wildlife, and plants, and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with the National Marine Fisheries Service (NOAA Fisheries) and the U.S. Fish and Wildlife Service (USFWS), as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species. This Biological Opinion (Opinion) is the product of an interagency consultation pursuant to Section 7(a)(2) of the ESA and implementing regulations found at 50 CFR §402. The analysis also fulfills requirements under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The administrative record for this consultation is on file with the Hydropower Division, NOAA Fisheries, Northwest Region.

The Federal Energy Regulatory Commission (FERC) proposes to issue an operating license to Tacoma Power (formerly Tacoma Public Utilities), a public entity engaged in power generation and distribution to its customers, for the operation of the Cushman Hydroelectric Project (FERC Project No. 460), located in Mason County, Washington. The purpose of the Project is to generate and sell electricity. FERC is proposing to issue the license according to its authority under the Federal Power Act.

1.1 Background and Consultation History

In 1924, the former Federal Power Commission (now FERC) issued Tacoma Power a 50-year minor part license to flood 8.8 acres of Federal land. The Cushman Hydroelectric Project (hereinafter, the Project) is and has been otherwise unlicensed. The Project consists of two dams and two powerhouses which utilize water from the North Fork of the Skokomish River. The Skokomish River is a major tributary to Hood Canal, an arm of Puget Sound, in Washington State. The Project has a total installed generating capacity of 131 MW. The minor part license was silent on issues such as natural resource protection and mitigation, as it was on the dams, powerhouses, and other project components. The minor part license expired in 1974, and Tacoma Power filed an application for a new major project license, encompassing all of the Project works. The Project has operated from 1974 to 2003 under annual licenses, which have been automatically extended by FERC while the new license proceeding has been ongoing. Since 1999, the Project has operated under the new license order with all environmental measures stayed pending judicial review.

FERC is the lead agency and proponent of the action that is the subject of this consultation. Tacoma Power is the Applicant for licensing of the Project from FERC, and this license order creates the Federal nexus for consultation. On June 9, 2000, NOAA Fisheries received a Biological Assessment (BA) and request for Section 7 consultation from FERC. Submission of the BA and NOAA Fisheries' review initiated consultation under Section 7 of the ESA regarding

the proposed operating license for the Project. In its BA, FERC determined that threatened Puget Sound chinook salmon (*Oncorhynchus tshawytscha)* and Hood Canal summer chum salmon *(O. keta)* and their critical habitat occur within the Project area. FERC's conclusion that the proposed action either would not likely adversely affect, or would have no effect, on Puget Sound chinook salmon and Hood Canal summer chum salmon was made by assessing a number of license provisions that would improve degraded habitat, and included requirements for Tacoma Power to consult with the resource agencies, including NOAA Fisheries and FERC, ensuring that future actions would minimize any adverse effects on the listed salmon ESUs (FERC 2000).

On July 28, 2000, NOAA Fisheries received FERC's letter clarifying its intent to request comment on the BA and its conclusion that the Project, as licensed with the recommended measures, would not likely adversely affect either of the listed salmon evolutionarily significant units (ESU). NOAA Fisheries, in its August 9, 2000, letter, informed FERC that it did not concur with this determination, which initiated formal consultation.

The objective of this Opinion is to determine whether FERC's license, with its terms and conditions, is likely to jeopardize the continued existence of either of the listed ESUs or result in the destruction or adverse modification of their critical habitat.

During the consultation period, NOAA Fisheries met with Tacoma Power and attended a presentation on Tacoma Power's recent information that models the geomorphology and potential water velocities of Big Falls. Tacoma Power subsequently filed the two reports that support that information with FERC. NOAA Fisheries reviewed those reports and discusses them in this Opinion with respect to the probability of historic anadromous fish passage at Big Falls.

After issuing its draft Biological Opinion on December 1, 2003, NOAA Fisheries received comment letters from FERC, Tacoma Power, and the Skokomish Indian Tribe. In its December 12, 2003, letter, FERC concurred with NOAA Fisheries' non-jeopardy determination and noted that the reasonable and prudent measures are generally consistent with the 1998 license order. FERC provided another letter dated January 20, 2004, in which it recommended that NOAA Fisheries consider the comments filed by the Skokomish Indian Tribe and Tacoma Power in finalizing the Biological Opinion, but also noted that those comments did not persuade FERC to alter its position regarding the draft Biological Opinion.

In its letter dated December 11, 2003, Tacoma Power commented that the draft Biological Opinion is fatally flawed and unable to withstand serious analysis. Many of Tacoma Power's statements are vague and lacking specificity, but where they are specific, NOAA Fisheries addresses them in this final Opinion.

The Skokomish Indian Tribe provided a comment letter dated December 9, 2003, in which it sought to clarify or correct specific statements from the draft Biological Opinion. The most significant of the Tribe's comments links the reduction in Skokomish River channel capacity with the development of the Cushman dams. NOAA Fisheries believes this final Opinion corrects the minor errors and either incorporates the Tribe's suggestions or addresses the points it raised. Most importantly, there is no significant change to the analysis of project effects or the reasonable and prudent measures.

1.2 The Federal Trust Responsibility

Under the Federal trust responsibility, Federal agencies, including NOAA Fisheries, have a legal obligation to support the Puget Sound tribes in their efforts to preserve and rebuild treaty salmon fisheries in their usual and accustomed areas. The concept of "trust responsibility" is derived from the special relationship between the Federal Government and Indians, first delineated by Supreme Court Chief Justice John Marshall in *Cherokee Nation v. Georgia*, 30 U.S. 1(5 Pet.) (1831). Later, in *Seminole Nation v. United States*, 316 U.S. 286 (1942), the Supreme Court noted that the United States "has charged itself with moral obligations of the highest responsibility and trust" toward Indian tribes. The scope of the Federal trust relationship is broad and incumbent upon all Federal agencies. The U.S. Government has an obligation to protect tribal land, assets, and resources, as well as a duty to carry out the mandates of Federal law with respect to American Indian and Alaska Native tribes. This special relationship provides the Constitutional basis for legislation, treaties, and Executive Orders (EO) granting unique rights or privileges to Native Americans to protect their property and way of life.

In furtherance of this trust responsibility, and to demonstrate respect for sovereign tribal governments, the principles described above were incorporated into Secretarial Order No. 3206, dated June 5, 1997, and signed by the U.S. Secretary of Commerce and the U.S. Secretary of the Interior. This order, "American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act," directs the Department of Commerce and the Department of the Interior to carry out their respective responsibilities under the ESA in a manner that harmonizes the Federal trust responsibility with tribes, tribal sovereignty, and the statutory missions of each department, so as to avoid or minimize the potential for conflict and confrontation.

On May 14, 1998, EO 13084, "Consultation and Coordination with Indian Tribal Governments," was issued, requiring each Federal agency to establish meaningful consultation and collaboration with Indian tribal governments in formulating policies that significantly or uniquely affect their communities. The order requires Federal agency policymaking to be guided by principles of respect for tribal treaty rights and responsibilities that arise from the unique legal relationship between the Federal Government and Indian tribal governments. Furthermore, on issues relating to treaty rights, EO 13084 directs each agency to explore, and where appropriate, use consensual mechanisms for developing regulations.

On November 6, 2000, EO 13175 was signed, which supercedes EO 13084. The order carries the same title, but strengthens the government-to-government relationship between the United States and Indian tribes. It ensures that all Federal Executive departments and agencies consult with Indian tribes and respect tribal sovereignty as they develop policy on issues that impact Native American communities.

Because this ESA consultation is likely to affect Indian lands, tribal trust resources, and the exercise of American Indian tribal rights, NOAA Fisheries notified the Skokomish Indian Tribe of the consultation regarding the Project. In October 2002 and October 2003, NOAA Fisheries participated in technical level consultations with the Skokomish Tribe. These actions were taken in accordance with Secretarial Order 3206 (June 5, 1997), which provides instructions for notification and consultation with American Indian tribes when tribal interests may be affected by NOAA Fisheries' ESA consultations.

2. PROPOSED ACTION

Proposed actions are defined in NOAA Fisheries' regulations (50 CFR §402.02) as "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas." The proposed action entails the issuance of a new license by FERC for a major project at an existing dam, with continued operation, maintenance, and proposed modifications to the Cushman Hydroelectric Project as described in the FERC Order issuing a new license for Project No. 460, July 30, 1998. Because FERC proposes to issue a license, it must consult under ESA Section 7(a)(2).

2.1 General Description of the Proposed Project

The Project consists of two dams and two powerhouses which utilize water from the North Fork of the Skokomish River. The Skokomish River is a major tributary to Hood Canal, an arm of Puget Sound, in Washington State (Figure 1). The Project has a total installed generating capacity of 131 MW.

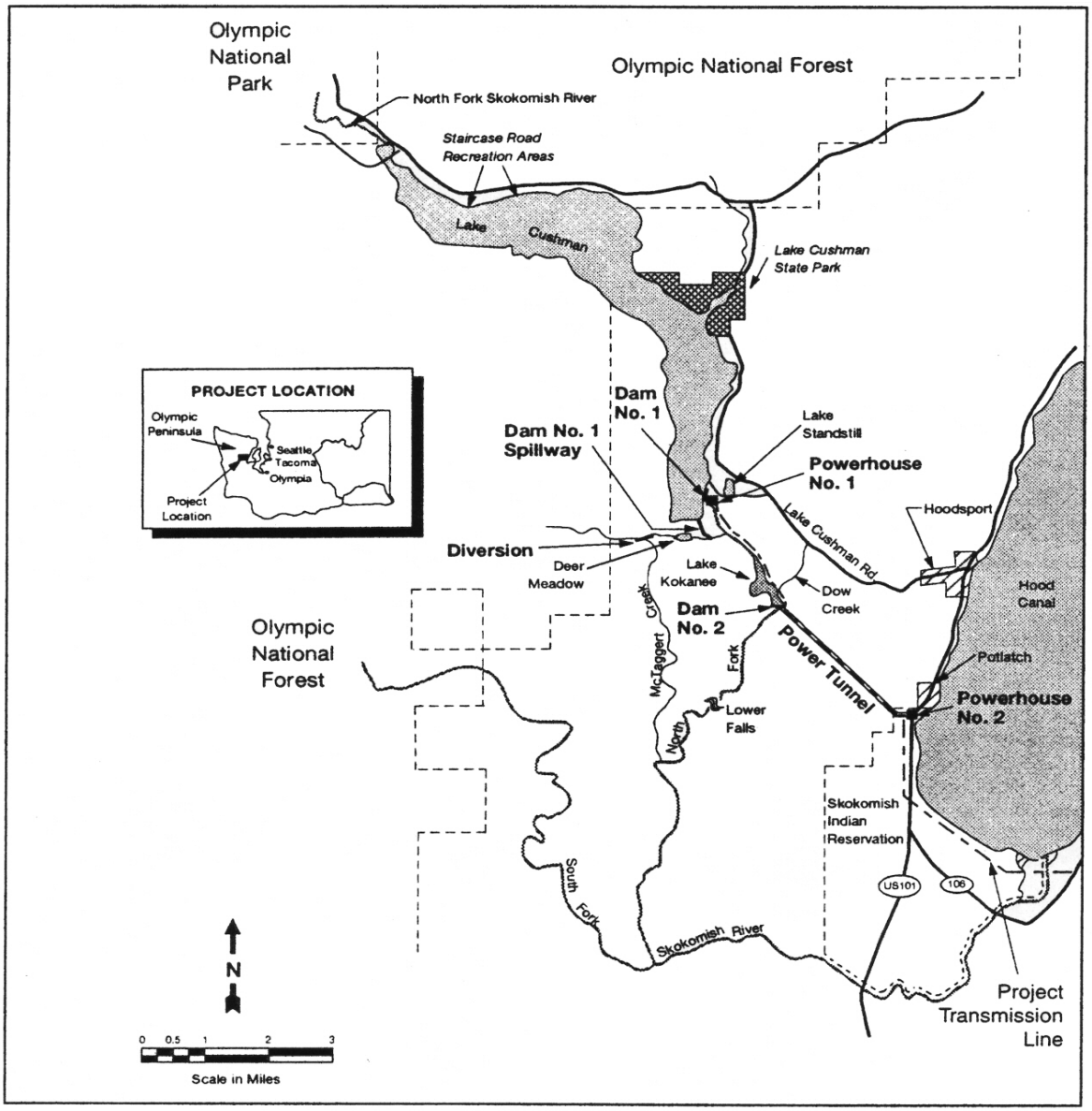

Figure 1. The Cushman Hydroelectric Project Area. Source: FERC.

Cushman Dam No. 1, a 260 ft-high concrete arch dam, was constructed in 1925 and 1926, and impounds Lake Cushman, a 9.6 mile-long storage reservoir of nearly 4,000 surface acres. Powerhouse No. 1, located about 600 ft downstream from Dam No. 1, has an installed generating capacity of about 50 MW.

Cushman Dam No. 2, about 2 miles downstream from Dam No. 1, was built in 1929 and 1930; it is a 230 ft-high concrete arch dam which impounds Lake Kokanee. The power intake from Dam No. 2 leads to a 17 ft-diameter pressure tunnel that extends 2.5 miles to a steel surge tank and three 12 ft-diameter, 1,350 ft-long steel penstocks. The penstocks connect to Powerhouse No. 2, which is situated on the Skokomish Indian Reservation on the shore of Hood Canal at Potlach. Powerhouse No. 2 has installed generating capacity of 81 MW. The estimated mean annual flow of the North Fork Skokomish River at Dam No. 2 is about 784 cfs for the period of record (October 1967 through September 1989) (FERC 1996).

2.2 Proposed License

FERC issued a new 40-year license to Tacoma Power for the continued operation of the existing, presently, and prospectively configured Cushman Hydroelectric Project (FERC Project No. 460), located on the North Fork of the Skokomish River, Puget Sound (Hood Canal), in the State of Washington on July 30, 1998. The license includes several measures to protect, mitigate damages to, and enhance fishery resources, including salmon species listed under the ESA.

FERC's proposed action is detailed in license articles contained in the license order. Certain license articles either are unclear or lack sufficient detail necessary to assess the specific action. In developing this Opinion, reasonable and prudent measures, and incidental take statement, NOAA Fisheries assumes implementation of only those actions explicitly required in the license. Where license articles require development of plans, NOAA Fisheries assumes the plans will be implemented.

FERC evaluated the effects of 8 terms and conditions of its Project license order, encompassing 11 license articles in its BA prepared for this consultation. Those terms and conditions are:

1. Implementation of flushing flow releases (Article 404).
2. Seasonal fluctuations in Lake Cushman elevation (Article 405).
3. Minimum flows in the lower North Fork Skokomish River (Article 407).
4. Freshwater and estuarine habitat enhancements and wildlife habitat enhancement (Article 412).
5. Fish passage (Articles 414, 415, 419).
6. Fish population enhancement (stocking kokanee, cutthroat, and rainbow trout) and restoration (Article 417).
7. False attraction flows (Article 418).
8. Recreational enhancements (Articles 413, 425).

NOAA Fisheries reviewed the license order, and herein analyzes the effects of 23 license articles, the actions of which may affect ESA-listed Puget Sound chinook salmon and Hood Canal summer chum salmon. The license articles reviewed for this Opinion are: 204, 301, 401, 402, 403, 404, 405, 406, 407, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 422, 423, and 425. NOAA Fisheries evaluates the effects of the relevant license articles on the survival and recovery of ESA-listed Puget Sound chinook salmon and Hood Canal summer chum salmon in Section 5 of this Opinion.

FERC has stayed all the fisheries protection, mitigation, and enhancement measures of the license order, pending judicial review of Tacoma Power's appeal. FERC's BA addresses the proposed Federal action, but not the stay of license conditions, which is also a Federal action. The Project operates with FERC's stay of fishery mitigation terms and conditions, rather than the license order, but this Opinion assesses the actions FERC proposes in the license order. NOAA Fisheries is not consulting on the Project effects of conditions presently permitted by FERC, except as they pertain to evaluation of the environmental baseline (Section 4) which has contributed to the current status of the ESA-listed species (Section 3).

2.3 Biological Opinion

The objective of this Opinion is to determine whether FERC's issuance of a 40-year license to Tacoma Power for operation of the Cushman Hydroelectric Project is likely to jeopardize the continued existence of Puget Sound chinook salmon and Hood Canal summer chum salmon. The term of this Opinion is for the term of the license, i.e., through July 30, 2038.

As explained below in Section 2.4, NOAA Fisheries evaluates the effect of the Project in its jeopardy analysis. This Opinion does not include a critical habitat analysis, because critical habitat designations for these ESUs were recently vacated by court order. On February 16, 2000, NOAA Fisheries designated critical habitat for 19 ESUs of chinook, chum, and sockeye salmon, as well as steelhead trout in Washington, Oregon, Idaho, and California. On September 27, 2000, NOAA Fisheries approved Amendment 14 to the Pacific Coast Salmon Fishery Management Plan designating marine and freshwater essential fish habitat (EFH) for Pacific salmon pursuant to the MSA. Shortly after these designations, the National Association of Homebuilders filed a lawsuit challenging the designations on a number of grounds. On April 30, 2002, the U.S. District Court for the District of Columbia adopted a consent decree resolving the claims in the lawsuit. Pursuant to that consent decree, the Court issued an order vacating the critical habitat designations, but retaining the MSA EFH (National Association of Homebuilders et al. v. Evans, Civil Action No. 00-2799 [CKK] [D.D.C., April 30, 2002]). Thus the critical habitat designation for Puget Sound chinook salmon is no longer in effect. NOAA Fisheries intends to reissue critical habitat designations. Reinitiation of consultation will be required if the proposed action affects critical habitat designated after consultation has been completed (50 CFR §402.16(d)).

2.4 Evaluating the Proposed Action

This section reviews the approach used in this Opinion in order to apply the standards for determining jeopardy and destruction or adverse modification of critical habitat as set forth in Section 7(a)(2) of the ESA and as defined by 50 CFR §402.02 (the consultation regulations). Additional guidance for this analysis is provided by the Endangered Species Consultation Handbook, March 1998, issued jointly by NOAA Fisheries and the USFWS. In conducting analyses of actions under Section 7 of the ESA, NOAA Fisheries uses the following steps of the consultation regulations:

1. Evaluate biological requirements and current status of the species at the ESU level and within the particular action area (Sections 3 and 4.1).

2. Evaluate the relevance of the environmental baseline in the action area to action-area biological requirements and the species' current rangewide and action-area status (Section 4).

3. Determine the effects of the proposed or continuing action on the species and on any designated critical habitat (Section 5).

4. Determine and evaluate any cumulative effects within the action area (Section 6).

5. Evaluate whether the effects of the proposed action, taken together with any cumulative effects and added to the environmental baseline, can be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of the affected species, or is likely to destroy or adversely affect their designated critical habitat (Section 7). (See CFR §402.14(g).)

In completing step 5, NOAA Fisheries determines whether the action under consultation, together with all cumulative effects when added to the environmental baseline, is likely to jeopardize the ESA-listed species or adversely modify critical habitat. If so, NOAA Fisheries must identify reasonable and prudent alternatives (RPA) for the action that avoid jeopardy or adverse modification of critical habitat and meet the other regulatory requirements for RPAs. (See CFR §402.02.)

2.5 Description of the Action Area

An action area is defined by NOAA Fisheries regulations (50 CFR §402) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." In this instance, NOAA Fisheries has determined that the area directly or indirectly affected by the Project extends from the upstream limit of Puget Sound chinook

salmon and Hood Canal summer chum salmon spawning in the North Fork Skokomish River[1] downstream to the mainstem Skokomish River and estuary. The discharge of North Fork Skokomish River water at Powerhouse No. 2 at Potlatch into the Hood Canal, also extends the action area to the Potlatch area of Hood Canal.

[1]The prospective limit of adult chinook salmon migration is the upper North Fork Skokomish River upstream of Lake Cushman to the first natural barrier to migration, at or upstream of Staircase Rapids. The upstream limit of adult chum salmon migration is Little Falls at RM 15.6 on the North Fork Skokomish River.

3. BIOLOGICAL INFORMATION

In step 1 of its analysis, NOAA Fisheries considers the current status of the listed species, taking into account viability criteria (population size, productivity, population spatial structure, and diversity) and, if available, an assessment of population projections relative to survival and recovery criteria. To assess the current rangewide status of the listed species, NOAA Fisheries starts with the determinations made in its decision to list for ESA protection the ESUs considered in this Opinion, and also considers any new data that is relevant to the determination. This section evaluates the rangewide status of the relevant ESUs, within the context of their rangewide biological requirements. The primary references containing this information for Puget Sound chinook salmon and Hood Canal summer chum salmon are provided in Table 1. The following sections briefly describe the current status of the species (listing status, general life history, and population dynamics) in a manner that is relevant to each species' biological requirements. Additional information is also available on NOAA Fisheries' Northwest Region website: http://www.nwr.noaa.gov.

Table 1. References to Status Reviews and Federal Register Notices containing additional information concerning listing status, biological information, and critical habitat designations for listed and proposed species considered in this Biological Opinion.

Species (Biological Reference)	Listing Status Reference	Critical Habitat Reference
Chinook Salmon from Washington, Idaho, Oregon and California, (Myers et al. 1998).	The Puget Sound ESU is listed as Threatened under the ESA by NOAA Fisheries, (64 FR 14308, March 1999).	Proposed Critical Habitat for the Puget Sound ESU, (63 FR 11481, March 9, 1998).
Hood Canal summer chum salmon, (Johnson et al. 1997).	Threatened Status for Two ESUs of Chum Salmon in Washington and Oregon, (64 FR 14508, March 1998).	Designated Critical Habitat: Critical Habitat for 19 Evolutionarily Significant Units of Salmon and Steelhead in Washington, Oregon, Idaho, and California. (65 FR 7764, February 2000).
(Preliminary conclusions regarding the updated status of listed ESUs of West Coast salmon and steelhead - Sections A and E (WCBRT 2003)		

3.1 Rangewide Status

The Puget Sound chinook salmon ESU encompasses all naturally spawned runs of chinook salmon that occur downstream of impassable natural barriers in the Puget Sound region from the North Fork Nooksack River to the Elwha River on the Olympic Peninsula (Myers et al. 1998). Several hatchery stocks considered essential for recovery of the natural stocks are also included in the ESU (Table 1 of 64 FR 14308). However, only wild chinook salmon are listed as threatened in the Skokomish River Basin. Puget Sound chinook salmon were listed as threatened on March 24, 1999 (64 FR14308).

The Hood Canal summer-run chum salmon ESU includes all naturally spawned runs of summer chum salmon that occur in tributaries of Hood Canal, a fiord-like portion of Puget Sound. Hood Canal summer chum salmon were listed as threatened on March 25, 1998 (64 FR 14508).

Consistent with their listing, most populations comprising these listed ESUs are not viable. Critical habitat for chinook salmon and summer chum salmon was designated on February 16, 2000 (65 FR 7764). However, NOAA Fisheries is currently reassessing the status of these ESUs.

3.2 Life Histories and Population Trends

The biological requirements, life histories, migration timing, historical abundance, and factors contributing to the decline of Puget Sound chinook salmon and Hood Canal summer chum salmon have been well documented (see Table 1). The following sections summarize the relevant biological information for Puget Sound chinook salmon and Hood Canal summer chum salmon contained in these documents.

3.2.1 Puget Sound Chinook Salmon

The Puget Sound ESU is comprised of 31 historically quasi-independent populations of chinook salmon, 22 of which are believed to be extant. Of these, only 2 to 6 are thought to be viable, or naturally self-sustaining (WCBRT 2003). Natural spawning escapement from 1992-1996 averaged 13,000 for the north Puget Sound populations, and long- and short-term trends for these populations were negative (Myers et al. 1998). South Puget Sound populations averaged 11,000 spawners for the same period and trends were mainly positive.

Overall abundance of chinook salmon in this ESU has declined substantially from historical levels, and many populations are small enough that genetic and demographic risks are likely to be relatively high (63 FR 11494, March 9, 1998). Both long- and short-term trends in abundance are predominantly downward, and several populations within this ESU are exhibiting severe short-term declines (63 FR 11494, March 9, 1998). Nehlsen et al. (in Myers et al. 1998) contend that these stocks pose special concern and are at moderate extinction risk.

Chinook salmon of the Skokomish River Basin are of mixed origin, having originated from native and non-native fish. Production in the basin is sustained by both wild and artificial production (SASSI 1992), though wild chinook salmon production is depressed.

Chinook salmon of the Skokomish River Basin primarily exhibit an ocean-type life history strategy, with smolts migrating to the estuary and ocean during their first year. Estuary rearing is important for chinook salmon that outmigrate as subyearlings (Groot and Margolis 1991). Outmigrating smolts feed, grow, and develop their ability to osmoregulate in saltwater during this period. Chinook salmon smolts use the Skokomish estuary from March through the end of

August, according to information collected by the Skokomish Tribe, and have been observed in Hood Canal estuaries and nearshore environments nearly every month of the year, according to unpublished data from the Port Gamble Tribe.

Skokomish River chinook salmon return to spawn at ages of 2 to 5 years, with the majority of spawners 3 to 4 years old, and have coastal-oriented ocean migration patterns (Myers et al. 1998).

Resident Skokomish River Chinook Salmon

The Skokomish River Basin chinook salmon population includes an unusual characteristic in the form of a population segment land-locked upstream of Dam No. 1 in Lake Cushman and the upper North Fork Skokomish River. These fish are naturally reproducing and may include a relic segment of the endemic historic chinook salmon population, as well as chinook salmon stocked from the State of Washington's George Adams Hatchery. As naturally reproducing chinook salmon, they are part of the listed Puget Sound chinook salmon ESU. Although cut off by the Cushman dams from completing their migratory circuit, it is entirely reasonable to conclude that these fish continue to contribute to the lower Skokomish chinook salmon population. This could occur by Lake Cushman juvenile chinook salmon sounding 130 ft to exit the reservoir via the penstocks and turbines at Dam No. 1, and by migrating through Lake Kokanee and exiting via the power tunnel, penstocks, and turbines to Hood Canal. The mortality rate would be high, but some fish would likely survive, based on evidence of turbine passage at Cushman and other hydroelectric projects. Those survivors that successfully complete the ocean migration would return to spawn in the lower North Fork Skokomish River to spawn downstream of Cushman Dam No. 2.

Tacoma Power, in its comment letter, questions the reasonableness of this conclusion. Chinook salmon are a migratory and anadromous species when access to the ocean is available. Although direct access to the ocean is not easily available from Lake Cushman, access does exist as described above. The observation of chinook salmon at Tacoma Power's own fish-counting house at Mayfield Dam on the Cowlitz River, and the more likely than not probability of those fish having migrated there from upstream of Tacoma Power's Mossyrock Dam (which requires sounding to a depth of 180 ft or more to enter the penstocks) on the same river, attests to the reasonableness of this conclusion. The fact that this event occurs on the Cowlitz River does not confirm that it occurs at Cushman; however, science is a process of systematic observation, and where conditions for migration are similar, the same species of salmon may behave the same.

Juvenile chinook salmon that are progeny from adult spawners observed in the upper North Fork Skokomish River enter Lake Cushman on their downstream migration. Some of these fish are known to residualize, grow, and mature to become the next generation of land-locked spawners. Presumably, other juvenile chinook salmon migrate through Lake Cushman and enter the penstocks of Dam No. 1 and pass through the turbines of Powerhouse No. 1, with the survivors

entering Lake Kokanee. These fish would continue the short migration through Lake Kokanee and enter the power tunnel and penstocks of Dam No. 2 and pass through the turbines of Powerhouse No. 2 at Potlatch. Tests conducted in 1960 and 1961 by Washington Department of Fish and Wildlife (WDFW) with hatchery coho smolts found that 55% of the fish survived the turbine passage from Dam No. 2 at more than 400 ft of head (Tacoma Power 1991). The head at Dam No. 1 is 260 ft and might logically be expected to have a higher turbine passage survival rate.

That such a migration occurs is not documented for the chinook salmon at the Cushman project. However, it is well established that juvenile chinook salmon enter the upstream end of Riffe Lake, a 26-mile-long reservoir at Tacoma Power's Cowlitz River Hydroelectric Project, and sound about 200 ft to enter the penstocks of Mossyrock Dam, with surviving smolts then migrating 12 miles through Mayfield Lake and entering the fish counting house at the fish passage facilities there (LaRiviere 2002; Kohn 2002). There is no biological nor mechanical reason to conclude that similar fish behavior and results would not occur at the Cushman project.

3.2.2 Hood Canal Summer Chum Salmon

The Hood Canal ESU is comprised of 16 historically quasi-independent chum salmon populations, 9 of which are presumed to be extant. Most of the extirpated populations occur on the eastern side of Hood Canal, and some of the 7 putatively extinct stocks are the focus of extensive supplementation programs underway in the ESU (WCBRT 2003).

Hood Canal summer chum salmon populations numbered but a few hundred in the early 1990s, with Skokomish River summer chum salmon considered extirpated (i.e., they were not identified with the Skokomish River Basin in the 1992 SASSI report). Hood Canal summer chum salmon have been cultured in eight hatchery programs in the Hood Canal region, and the population is showing an increasing trajectory, with a few observed in the North Fork Skokomish River (Leigh 2002). To the extent that summer chum salmon occur in this river system, they are considered to be naturally produced fish, presumably straying there, as there is no artificial production in the Skokomish River. As Hood Canal summer chum salmon populations increase, increasing numbers of summer chum salmon can reasonably be expected to stray into, and colonize potentially suitable habitat within, the North Fork Skokomish River.

Hood Canal summer chum salmon of the Skokomish River Basin exhibit an ocean-type life history strategy, with smolts migrating to the estuary and ocean during their first year. Estuary rearing is important for chum salmon that outmigrate as subyearlings (Groot and Margolis 1991). Outmigrating smolts feed, grow, and develop their ability to osmoregulate in saltwater during this period. Summer chum smolts have been observed by the Skokomish Tribe in the estuary from as early as January through May. Summer chum adults return to spawn at ages of 3 to 5 years.

3.3 Significant Factors Influencing Rangewide Status

3.3.1 Puget Sound Chinook Salmon[2]

Habitat throughout the ESU has been blocked or degraded. In general, upper tributaries have been impacted by forest practices and lower tributaries and mainstem rivers have been impacted by agriculture and urbanization. Diking for flood control, draining and filling of freshwater and estuarine wetlands, and sedimentation due to forest practices and urban development are cited as problems throughout the ESU. Blockages by dams, water diversions, and shifts in flow regime due to hydroelectric development and flood control projects are major habitat problems in several basins. Bishop and Morgan (1996) identified a variety of critical habitat issues for streams in the range of this ESU, including changes in flow regime (all basins), sedimentation (all basins), high temperatures (Dungeness, Elwha, Green/Duwamish, Skagit, Snohomish, and Stillaguamish Rivers), streambed instability (most basins), estuarine loss (most basins), loss of large woody debris (Elwha, Snohomish, and White Rivers), loss of pool habitat (Nooksack, Snohomish, and Stillaguamish Rivers), and blockage or passage problems associated with dams or other structures (Cedar, Elwha, Green/Duwamish, Snohomish, and White Rivers).

The Puget Sound Salmon Stock Review Group provided an extensive review of habitat conditions for several of the stocks in this ESU (WCBRT 2003). The February 20, 2003, draft report concluded that reductions in habitat capacity and quality have contributed to escapement problems for Puget Sound chinook salmon, citing evidence of direct losses of tributary and mainstem habitat due to dams, and of slough and side-channel habitat due to diking, dredging, and hydromodification. It also cited reductions in habitat quality due to land management activities.

Nearly 2 billion hatchery fish have been released into Puget Sound tributaries since the 1950s (Myers et al. 1998). The vast majority of these fish have been derived from local returning fall-run adults. Returns to hatcheries have accounted for 57% of the total spawning escapement, although the hatchery contribution to spawner escapement is probably much higher than that due to hatchery-derived strays on the spawning grounds. Almost all of the releases into this ESU have come from stocks within this ESU, with the majority of within-ESU transfers coming from the Green River Hatchery or hatchery broodstocks that have been derived from Green River stock (Marshall et al. 1995). The electrophoretic similarity between Green River fall-run chinook salmon and several other fall-run stocks in Puget Sound (Marshall et al. 1995) suggests that there may have been a significant effect from some hatchery transplants.

Harvest impacts on Puget Sound chinook salmon stocks were quite high. Ocean exploitation rates on natural stocks averaged 56%-59%; total exploitation rates averaged 68%-83% (1982-89

[2]The information in Section 4.3.1 was taken verbatim from Section A. Chinook Salmon of the 2003 WCBRT Report.

brood years) (McElhaney et al. 2000). Total exploitation rates on some stocks have exceeded 90% (McElhaney et al. 2000).

3.3.2 Hood Canal Summer Chum Salmon[3]

A variety of threats to the continued existence of the summer chum salmon populations in Hood Canal were identified, including degradation of spawning habitat, low river flows, possible competition among hatchery fall chum salmon juveniles and naturally produced summer chum salmon juveniles in Hood Canal, and high levels of incidental harvest in salmon fisheries in Hood Canal and the Strait of Juan de Fuca.

3.4 Species Status with Respect to Species-Level Biological Requirements

The current status of Puget Sound chinook salmon and Hood Canal summer chum salmon, as described above, indicates that the species-level biological requirements of these ESUs are not being met at this time. The abundance of Puget Sound chinook salmon and Hood Canal chum salmon, while increasing in recent years, remains far below historical levels. This information clearly indicates that substantial improvements in survival rates (assessed over the entire life cycle and throughout the range of the ESUs) are necessary to increase abundance to meet species-level biological requirements of the ESA-listed ESUs in the future. Because the effects of hydroelectric and flood control projects (including the Cushman project) have been identified as significant factors for decline, it is reasonable to expect that a portion of the needed survival improvement should be reflected in future operations at the Cushman project.

[3]The information in Section 4.3.2 was taken verbatim from Section E. Chum Salmon of the 2003 WCBRT Report.

4. ENVIRONMENTAL BASELINE

In step 2 of its analysis, NOAA Fisheries evaluates the relevance of the environmental baseline in the action area to the species' current status. In describing the environmental baseline, NOAA Fisheries emphasizes important habitat indicators for the listed salmonid ESU affected by the proposed action. The action area is described in Section 2.5 of this Opinion. NOAA Fisheries does not expect any other areas to be directly or indirectly affected by the proposed action.

4.1 Biological Requirements Within the Action Area

The relevance of the biological requirements of Puget Sound chinook salmon and Hood Canal summer chum salmon within the action area depends upon the biological requirements of the ESU as a whole and any constituent populations. NOAA Fisheries looks at certain criteria to assess the viability of fish populations that make up an ESU. The criteria that describe a viable salmonid population include 1) the abundance sufficient to withstand periodic environmental downturns, 2) the productivity (return rate) necessary to maintain or increase a population of fish, 3) the distribution throughout a geographic area that is large enough such that ecological disasters would not likely eliminate the entire population, and 4) a genetic diversity approaching the historical diversity of the population. Salmon and steelhead ESUs generally consist of multiple populations. ESUs with fewer populations are more likely to become extinct due to catastrophic events, and have a lower likelihood that the necessary genetic diversity will exist to maintain future viability. ESUs with a limited geographic range are similarly at increased extinction risk due to catastrophic events. ESUs with populations that are geographically distant from each other, or are separated by severely degraded habitat, may lack the connectivity to function as an ESU and are more likely to become extinct. ESUs with limited life-history diversity are more likely to go extinct as the result of environmental catastrophes or change that occurs too rapidly for an evolutionary response. ESUs comprised of a small proportion of component populations meeting or exceeding viability criteria may lack the source populations necessary to sustain the non-viable populations during environmental downturns. ESUs consisting of a single population are especially vulnerable in this regard.

Assessing an ESU's biological requirements involves evaluating the extent to which the current status of an ESU falls short of what would constitute a viable ESU. The fact that the current status of an ESU does not reflect historical abundance, productivity, spatial structure, or diversity does not mean that it is currently non-viable, but it may serve as an informative benchmark against which to weigh viability and the risk of extinction. Whether an ESU is at risk of extinction or endangerment depends on which viability criteria it fails to meet, what the past trend has been, and how far it is below the benchmark.

The biological requirements within the action area are those conditions that support the continued existence of the ESU by addressing the population-level biological requirements. Within the action area, the biological requirements of the chinook salmon and summer chum

salmon stem from the essential features of juvenile rearing areas, adult spawning areas, and juvenile and adult migration corridors. Therefore, the biological requirements for these species include adequate substrate, adequate water quality (including quantity, temperature and velocity), adequate cover and shelter, adequate riparian vegetation, adequate space, and adequate conditions for safe passage. In addition, an adequate food supply is required in juvenile rearing areas.

4.2 Environmental Baseline Within the Action Area

"The past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all the proposed Federal projects in the action area that have already undergone formal or early Section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process" are all included within the environmental baseline (50 CFR §402.02). The environmental baseline encompassed the effects of both human and natural factors leading to the current status of the species, but does not incorporate impacts specific to the proposed actions. Therefore, future impacts resulting from the future operation of the Project and other activities authorized pursuant to the proposed action are not part of the environmental baseline. Rather, the environmental baseline describes the current status of the species, and the factors currently affecting the species, including the past and present configuration and operation of the Project, within the action area.[4] The resulting "snapshot" of the species' health within the action area provides the relevant context for evaluating the anticipated effects of the proposed actions on the ESU's likelihood of survival and recovery relative to its biological requirements.

Tacoma Power, in its comment letter, argues that the baseline is not the historical environment prior to the construction of the Cushman Project, but Tacoma Power has confused FERC's baseline definition with the ESA baseline definition, which applies to this Opinion. As detailed above, the environmental baseline includes "the past and present impacts of all Federal, State, or private actions and other human activities in the action area."

4.2.1 Habitat and Fish Distribution Within the Action Area

The Skokomish River originates on the southeast slopes of the Olympic Mountain Range on Washington State's Olympic Peninsula. The South Fork headwaters in the Olympic National Forest in an area managed as a commercial forest. The North Fork headwaters inside the Olympic National Park, and the area remains relatively pristine. Similar to chinook salmon and

[4]It is clear that the existence and past operation of the Cushman project has substantially affected chinook salmon and summer chum salmon within the action area, and that some of these effects, to a lesser or greater degree, will likely continue into the future. It is equally clear that the future effects attributable to the continuing presence and the discretionary operation of this Project cannot be considered in the environmental baseline of this biological opinion because they have not yet undergone ESA Section 7(a)(2) consultation.

chum salmon habitat throughout the Puget Sound and Hood Canal ESUs, the South Fork and mainstem Skokomish have been significantly altered by human activities for nearly a century. The upper watershed and associated tributaries have been severely affected by current and historic logging practices on both steep slopes and within the riparian zone, resulting in large sediment transport downstream (Williams et al. 1975). The lower basin has been partially diked, and land use includes forestry, agriculture, and rural residential. The lower North Fork Skokomish River is impacted somewhat by forest practices and agriculture, but the out-of-basin diversion of water by the Project is the major effect.

The North Fork Skokomish River upstream of the Cushman dams retains potential for functional habitat for chinook salmon spawning, rearing, and migrating, if passage and access problems are addressed. Staircase Rapids, near RM 30 and about 2 miles upstream of Lake Cushman, were once considered an impassable barrier to migrating fish. New information by Brenkman (1998) indicates that the rapids are passable to bull trout, another ESA-listed fish species that occurs in the Skokomish River Basin. These rapids may also be passable by chinook salmon, although the resident, landlocked chinook salmon in Lake Cushman have not been observed upstream of the rapids.

Tacoma Power's argument regarding anadromy upstream of Big Falls

Tacoma Power contends that anadromous salmon and steelhead did not migrate upstream of the upper falls, also called Big Falls, consistently enough, or in large enough numbers, to sustain viable populations prior to the construction of Dams No. 1 and No. 2. NOAA Fisheries has reviewed the Project's administrative record, including Tacoma Power's filings subsequent to the 1998 license order which includes the reports by Ruggerone (2001) and Simons and Associates (2001). NOAA Fisheries has also reviewed historical documents from the Washington State archive and made site visits to the lower and upper North Fork Skokomish River to observe other falls and cascades. Based on its review of the available information, NOAA Fisheries concludes that anadromous fish were able to migrate upstream past Big Falls and reach spawning habitat upstream of the pre-dam Lake Cushman. This conclusion is based on the following information and reasons: 1) the Washington Department of Fisheries (WDF) raised these concerns on numerous occasions about the construction of Dam No. 1 blocking off access to chinook salmon and steelhead trout spawning habitat and inundating the land that it had purchased for an egg-taking facility (Mayhall 1926; Pollock 1927a, 1927b, 1929; Moore 1948; James 1998); 2) the report of a fishery enforcement officer describing the poaching of chinook salmon and steelhead by the construction workers at the site of Dam No.1 (Stetson 1925); 3) the recorded statements of individuals that they had observed salmon and steelhead upstream of the site of Dam No. 1 (Tacoma Power 1992); 4) Tacoma Power settled WDF's demands for the construction of fishways at the Cushman project by providing alternative mitigation, i.e., funds for the construction and operation of the George Adams Hatchery; 5) the existence of a traditional Native American fishing site at Big Falls (James 1995, 1998), which would have been unlikely unless anadromous fish runs were both substantial and consistent; 6)

an analysis of nitrogen levels taken from cores removed from old stumps located upstream of Dam No. 1 indicate a marine source, i.e., salmon, for these levels was involved (Stanculescu 2003); and 7) the characterization of Big Falls by underwater divers as a ". . . steep cascades formed by a number of large boulders in the river bed" (Wessen & Associates 1993), which directly contradicts the modeled description of Big Falls in Ruggerone's 2001 report.

In contrast, the basis for Tacoma Power's position that anadromous fish, including bull trout, were unable to migrate past Big Falls, or under conditions too infrequent to sustain significant populations, seems to rest entirely on the results of a bathymetric modeling exercise and subsequent hydraulic analysis of Big Falls (Ruggerone 2001; Simons and Associates 2001). Specifically, Tacoma Power concludes from data interpreted by sonar equipment and interpolated using a smoothing algorithm that Big Falls was a smooth bedrock chute, lacking large boulders (Ruggerone 2001), and that these physical conditions resulted in water velocities that were too high and flow conditions too turbulent for fish to pass Big Falls (Simons and Associates 2001).

NOAA Fisheries is not persuaded that the modeling of Big Falls using remote sensing techniques (i.e., sonar) provides an accurate enough representation or approximation of Big Falls to be able to conduct a hydraulic analysis with sufficient resolution for the purpose of determining fish passage. Among the factors that would seriously affect the accuracy and precision of the model are: 1) the deposition of silt and debris from landslides that may have occurred since the filling of Lake Kokanee in 1930; and 2) limitations due to the combination of depth (85 to 95 ft), the frequency and angle of the sonar beam; and the subsequent interpolation of the sonar data, which is already an approximation of the bathymetry (Ross 2002; Steward and Associates 2002). For example, a transducer with a 1° cone angle at a depth of 90 ft would take data from a target area larger than an 18" diameter circle and treat everything within the target area as the same (i.e., the same elevation). Given that these data were then used in a smoothing algorithm to create a model of the bottom profile, it is difficult to see how this approach would be able to first measure the bottom profile irregularities and then maintain that resolution. Following Ruggerone's (2001) effort, Simons and Associates (2001) used the one-dimensional HEC-RAS hydraulic model to predict water velocities through the inaccurately assumed smooth channel, which exacerbates the earlier inaccuracies. This was a process that created errors in the initial data collection and multiplied those errors with the smoothing algorithm, and finally exacerbated those errors with the single dimension model of water velocity.

The results of Tacoma Power's bathymetry modeling exercise, i.e., Big Falls was a smooth high gradient bedrock chute that was lacking in any large boulders in the vicinity of the falls that might have provided a refuge from high velocities (Ruggerone 2001), is in direct conflict with Tacoma Power's 1993 characterization of Big Falls that was based on the direct observations of underwater divers that reported Big Falls to be ". . . a steep cascade formed by a number of large boulders in the river bed . . ."(Wessen & Associates 1993). NOAA Fisheries believes the visual observations made by divers provide a much more reliable and accurate description of Big Falls

than a description based on remotely sensed and transformed data. Since Tacoma Power's passage analysis was based on the results of the bathymetry model, NOAA Fisheries does not consider it valid for the purpose of determining whether Big Falls was passable by salmon.

The lack of precision in Tacoma Power's model and hydraulic analysis create doubt about the passage conditions actually experienced by migrating fish and the conflicting visual observations by Tacoma Power's consultants strongly confirm that the model is not suited to this kind of determination (Wessen & Associates 1993). This information, along with tribal and other historic accounts, causes NOAA Fisheries to conclude that anadromous fish passage upstream of Big Falls and the historic Lake Cushman was consistent enough to sustain salmon populations.

Tacoma Power's letter of comment insists NOAA Fisheries erroneously dismissed the most recent and best scientific and commercial data available, and summarily dismisses the new information submitted to FERC and NOAA Fisheries by Tacoma Power regarding the historical picture. NOAA Fisheries reviewed Tacoma Power's information and concluded that, although recent, it decidedly does not represent the best scientific or commercial data available. Many of the sources listed above are historic eyewitness observations of salmon upstream of Big Falls. Further, the assumptions of a smooth bedrock channel that are necessary for Tacoma Power's modeling exercise to be appropriate are not met and are directly contradicted by eyewitness testimony, including the eyewitness diver's report of Tacoma Power's own consultant, Wessen & Associates (1993). Tacoma Power further represents that NOAA Fisheries relied on Stanculescu's observation of marine source nitrogen, as an untested master's thesis, unlike the scientifically accepted method performed by Ruggerone. Identification of marine source stable nitrogen and carbon isotopes is a tested technique (Bilby et al.1996), and is not NOAA Fisheries' only source of information pertaining to the historic occurrence of anadromous fish upstream of Big Falls. Ruggerone's report may have utilized scientific methods and materials, but it is flawed in its inaccurate characterization of Big Falls as a smooth bedrock channel. Therefore, its conclusions, and Simon's, are inappropriate to an assessment of anadromous fish passage at Big Falls. NOAA Fisheries' Opinion is substantiated by the best available scientific and commercial data, indicating the preponderance of evidence that anadromous fish consistently occurred upstream of Big Falls.

4.2.2 Factors for Decline Within the Action Area

Pre-twentieth century levels of Skokomish River chinook salmon and summer chum salmon production are unknown. However, estimates of historic chinook salmon runs range as high as 42,000, and as high as 118,000 for chum salmon (Lichatowich 1992). Most of the chum salmon would have been of the fall/winter variety, with a fraction of the run being summer chum salmon. Prior estimates of salmon production did not assume migration upstream of Staircase Rapids, which might be passable to chinook salmon. If they had, the chinook salmon run size estimate would be larger.

Past and present land-use activities and the existence and past and present operation of the Project have contributed substantially to the current status of Puget Sound chinook salmon and Hood Canal summer chum salmon within the action area. Nearly all the juveniles and adults of the Skokomish River population of Puget Sound chinook salmon, and whatever proportion of Hood Canal summer chum salmon that occurred in the Skokomish River, have been affected by the continuing effects of the human activities that contributed to the existing conditions in the migration corridor. In the North Fork Skokomish River (from the uppermost extent of historical anadromous fish migration downstream to the confluence of the South Fork Skokomish River), the primary factor for declining productivity is lack of water due to diversion by Dam No. 2 and lack of passage at both Dam No.1 and Dam No. 2. In the mainstem Skokomish River (downstream of the South Fork and North Fork confluence) and estuary, the reduced productivity of chinook salmon and summer chum salmon is primarily a result of past and present land management practices (logging and associated road building) in the South Fork Skokomish River (which is outside the action area).

Cushman project construction was initiated in 1926 and completed in 1930. Since that time, the Project has blocked access to habitat that was historically available to chinook salmon that could ascend Little Falls (RM 15.6) and Big Falls (RM 18.3).[5] Chum salmon, and summer chum salmon in particular, apparently did not ascend these falls historically. Upon completion, the Project diverted the entire flow to Powerhouse No. 2 at Potlatch and dewatered the lower North Fork Skokomish River, except for accretion flow and part of the remaining flow in McTaggert Creek, a small tributary stream. By diverting the North Fork Skokomish River's water out of the basin, the Project adversely modified habitat for both chinook salmon and summer chum salmon downstream of the Project, by either eliminating or substantially reducing its availability in the lower North Fork.

Since the completion of Dam No. 2 in 1932, the lower North Fork Skokomish River was dry, or nearly dry, downstream to McTaggert Creek, a distance of four miles. Anadromous fish were effectively extirpated from this point upstream. Tacoma Power began releasing 30 cfs into the lower North Fork Skokomish River at Dam No. 2 in 1988. The North Fork Skokomish River is presently accessible to listed chinook salmon and summer chum up to Little Falls. Tacoma Power has released about 60 cfs from Dam No. 2 since April 1999, making most of the lower North Fork Skokomish River accessible as salmonid habitat. Gravel suitable for spawning is generally absent upstream of Little Falls, becoming more abundant downstream of the falls where there are donor banks in the hillside, and very abundant downstream of the confluence of

[5]Tacoma Power contends that no, or few, salmon and steelhead ascended the North Fork Skokomish River upstream of Big Falls, which presently lie beneath the waters of Lake Kokanee. However, the Skokomish Indian Tribe and the State of Washington have presented evidence, beginning with the early history of the Project, that salmon and steelhead, abundant enough to be significant to the Skokomish River Basin's fish populations, occurred upstream of Big Falls. Estimates of historic chinook salmon runs range as high as 42,000, and chum salmon up to 118,000 (Lichatowich 1992). Most of the chum salmon would have been of the fall/winter variety, with a fraction of the run being summer chum salmon.

McTaggert Creek. The North Fork Skokomish River channel is generally incised from Dam No. 2 to just downstream of Little Falls. The remainder of the lower North Fork Skokomish River channel is encroached by vegetation that has grown up over the decades of little or no water in the channel. Large woody debris is in short supply in this river reach, and when it occurs in the lower North Fork Skokomish River, it is generally deciduous material, rather than longer lasting conifers.

Chinook salmon and summer chum salmon habitat in the North Fork Skokomish River is compromised primarily by the Project. The headwaters of the North Fork Skokomish River are entirely within the Olympic National Park and remain in pristine condition. There are campground, recreational, and residential developments around the Project reservoirs, and industrial forestry and limited agriculture on the lower North Fork Skokomish River. The diversion of the entire water flow of the North Fork Skokomish River from 1932 to 1988, and 96% of the flow from 1988 to 1999, along with the barriers to migration, are the principle effects on salmonid habitat. The fundamental effect has been the removal of aquatic habitat through the removal, by out-of-basin diversion, of the North Fork Skokomish River's water and denial of fish access to the upper North Fork.

Fish habitat in the mainstem Skokomish River downstream of the confluence of the North and South Forks is degraded. The Skokomish River Basin's forest lands include many steep and unstable slopes that, since logging, have resulted in many sites of mass wasting and consequent sediment and bedload transport into the Skokomish River. The huge sediment volume exceeds the river's flushing capacity, and the mainstem channel is very aggraded, with current hydraulic capacity of about 5,000 cfs, down from an estimated 13,000 cfs (Stetson Engineers 1998). The Skokomish Indian Tribe (Jay 2001) provided information that correlates a degrading mainstem channel capacity with the development of the Cushman dams. Bankfull capacity was 33,000 - 41,000 cfs in 1924, 23,000 cfs in 1933, 18,000 cfs in 1938, and 13,000 cfs in 1941 (Jay 2001). Jay's declaration indicates that mainstem channel capacity degradation precedes the initiation of major logging and associated actions in the 1940s that caused mass wasting and resultant sediment aggradation.

4.2.3 Matrix of Pathways and Indicators

The Matrix of Pathways and Indicators (see Appendix A) of habitat quality lists the pathways, or significant environmental features, and the indicators of the habitat's suitability to salmon survival. The pathways are water quality, access, elements, channel dynamics and watershed condition. The water quality indicators are water temperature, sediment, turbidity, and contamination. The access indicators are barriers to migration. The habitat element indicators are substrate, large woody debris, pool frequency and quality, off-channel habitat, and refugia. The channel dynamics indicators are channel morphology, streambank conditions, flood plain connectivity, and altered streamflows. The watershed condition indicators are increases in

drainage network, road density and location, disturbance history, and riparian reserves. Each indicator is rated according to function as functioning, at risk, or not properly functioning.

The majority of the habitat indicators within the action area are not properly functioning. In the mainstem Skokomish River, this is primarily attributable to logging and road-building activities in the South Fork that result in mass wasting and lack of sufficient riparian vegetation and reduced flows from the North Fork (as a result of the Project's water diversion) that result in high temperatures. In the North Fork Skokomish River, it is primarily due to the Project's past and present effects, including blockage of suitable habitat upstream of the Project and dewatering of suitable habitat downstream of the Project.

Most of the indicators associated with commercial forestry are not properly functioning, except in the upper North Fork Skokomish River, which lies inside the Olympic National Park and remains undisturbed. The only indicators rated as properly functioning are contamination, pool frequency and quality (in the North Fork), and riparian reserves (in the upper North Fork). Most habitat factors adversely affect the status of the Skokomish River population of the Puget Sound chinook salmon ESU and the Hood Canal summer chum salmon ESU.

In summary, the habitat biological requirements of the Puget Sound chinook salmon and Hood Canal summer chum salmon ESUs are not being met under the environmental baseline within the action area. The action area biological requirements not being met include:

1. Substrate, in the form of suitable spawning gravel between RM 15.6 and 17.3 on the lower North Fork Skokomish River.
2. Water quality, in the form of too much sediment from the South Fork Skokomish River.
3. Water quantity, due to insufficient stream flow in the lower North Fork Skokomish River from historic operations of Dam No. 2.
4. Water temperature, due to controlled historic operations of the Project, i.e., by storing water and releasing it from specific reservoir depths to the lower North Fork Skokomish River.
5. Water velocity, due to insufficient streamflow caused by historic operations of the Project, resulting in velocities not suitable for chinook salmon spawning in the lower North Fork Skokomish River.
6. Cover/shelter, due to the Dams No. 1 and No. 2 historically blocking large woody debris from reaching the lower North Fork Skokomish River.
7. Food (juvenile only), due to insufficient water to nurture benthic invertebrate productivity in the lower North Fork Skokomish River as a result of historic operations of the Project.
8. Space, due to insufficient streamflow in the lower North Fork Skokomish River, as a result of historic operations of the Project.

9. Access to habitat and safe passage conditions to and from the upper North Fork Skokomish River, due to the lack of fish passage facilities, as a result of historic operations of the Project.

Maintenance or further degradation of the existing conditions within the action area would contribute to the long-term declining trend of the ESA-listed Permit Species and thus would continue to increase the high risk of extinction on which the listings were based. Measures must be taken at the Project to avoid or minimize historical impacts that have contributed to the trend towards extinction and to aid in establishing improved conditions whereby the ESA-listed species will continue to exist into the future while retaining the potential for recovery. The successful implementation of these measures at the Project will be necessary for the proposed action to avoid jeopardizing listed Puget Sound chinook salmon and Hood Canal summer chum salmon.

4.3 Ongoing and Future Environmental Baseline Actions in Action Area

Section 7(a)(2) regulations provide that "the anticipated impacts of all the proposed Federal projects in the action area that have already undergone formal or early Section 7 consultation and the impacts of State or private actions which are contemporaneous with the consultation in process" are included within the environmental baseline.

NOAA Fisheries concludes that few Federal actions, and one State and one private action with Federal involvement, in this action area have completed Section 7 consultation. The State action is the Washington Department of Natural Resources Habitat Conservation Plan (HCP) and the Simpson Timber HCP, which both include improved forest practices, road building, and road maintenance actions that should substantially reduce the adverse effects from actions on these lands within the Skokomish River watershed. These particular State or private activities in this action area are reasonably certain to continue contemporaneously with the 40-year term of this Opinion, in addition to the current levels of rural and urban land use that affect the listed species. In addition, hatchery operations are typically permitted for periods of 5 to 10 years.

Therefore, when evaluating the status of the listed species, including their likelihood of survival and recovery, NOAA Fisheries concludes that new Federal actions, such as future timber sales and agricultural water withdrawals, that would be likely to adversely affect listed species, as well as future beneficial Federal actions, such as habitat restoration projects and conservation easements, are not eligible for consideration in determining whether the proposed action is likely to jeopardize their continued existence. Thus the future abundance and productivity of the Puget Sound chinook salmon and Hood Canal summer chum salmon, against which the effects of this action are considered, are likely to be, in part, improved, and in part, degraded, compared to those reflected by the historical trends resulting under the environmental baseline. It is NOAA Fisheries' judgment, based largely on the description of factors for the decline of these species, that the net effect of the environmental baseline would be an improvement of future abundance

and productivity of these species. This improvement cannot be quantified, but NOAA Fisheries does not consider this improvement sufficient to meet all biological requirements within the action area.

4.4 Status of the Species within the Action Area

For Puget Sound chinook salmon and Hood Canal summer chum salmon, the environmental baseline, as described above, while improving, does not currently meet biological requirements for these species within the action area. Maintenance or further degradation of the existing conditions within the action area would contribute to the long-term declining trend of the ESA-listed species and thus would continue to increase the risk of extinction on which the listings were based. Measures must be taken at the Project to avoid or minimize ongoing impacts that have contributed to the trend towards extinction and to aid in establishing improved conditions whereby each species will continue to exist into the future while retaining the potential for recovery. The successful implementation of these measures at the Project will be necessary for the proposed action to avoid jeopardizing the ESA-listed salmon species.

5. ANALYSIS OF EFFECTS OF THE PROPOSED ACTION

Effects of the action are defined as "the direct and indirect effects of an action on the species, together with the effects of other activities that are interrelated or interdependent with the action, that will be added to the environmental baseline" (50 CFR §402.02). Direct effects occur at the project site and may extend upstream or downstream based on the potential for impairing important habitat elements. Indirect effects are defined in 50 CFR §402.02 as "those that are caused by the proposed action and are later in time, but still are reasonably certain to occur." They include the effects on listed species of future activities that are induced by the proposed action and that occur after the action is completed. "Interrelated actions are those that are part of a larger action and depend on the larger action for their justification" (50 CFR §403.02). "Interdependent actions are those that have no independent utility apart from the action under consideration" (50 CFR §402.02).

The biological requirements of the listed species are currently not being met under the environmental baseline throughout the ESUs of both species. The current rangewide status of the Puget Sound chinook salmon and Hood Canal summer chum salmon ESUs are referenced in Table 1 of this Opinion.

5.1 Effects of the Proposed Action

In step 3 of its jeopardy approach, NOAA Fisheries evaluates the effects of proposed actions on listed salmon and steelhead in the context of whether the species can be expected to survive with an adequate potential for recovery under the effects of the proposed (or continuing) action. The action also must restore, maintain, or at least not appreciably interfere with the recovery of the properly functioning condition of the various fish habitat elements within a watershed.

5.1.1 Article 204: Effects of wildlife lands

This article requires the Licensee to file a revised exhibit showing wildlife habitat parcels to which title or development rights have been obtained. The prospective location and management of such lands are uncertain, and they may include riparian lands that may affect aquatic habitat used, or potentially used, by listed chinook salmon and summer chum salmon. For the purpose of this consultation, it is assumed that natural area management would be practiced, and that no deleterious development would be permitted near water or in the riparian zone. Therefore, there will be either no effect if the land is currently undeveloped, or the effects will not reduce the function if habitat is currently degraded and will be restored.

5.1.2 Article 301: Effects of commencing construction of project facilities and enhancement and mitigation measures within 2 years and completing within 4 years of license issuance

There is no effect for two years; the relevant baseline conditions continue. During the subsequent two years, the adverse effects of construction will occur. The expected effects are those of erosion, sedimentation, turbidity, and temporary dewatering for in-channel construction, which should limit adverse effects to minor, if not negligible, take of listed fish. NOAA Fisheries assumes that it will result in the following types of habitat improvement: restoration of passage, increased instream flow, and improved in-channel habitat diversity and complexity.

The subject license was issued in July 1998. Several license articles include significant prospective benefits to listed salmon. Survival and recovery of listed salmon species is facilitated by early action. Summer chum salmon were effectively extirpated from the North Fork Skokomish River when it was dewatered. Restoring significant streamflow soon will improve its attractiveness for recolonization to a recovering summer chum salmon population. Similarly, higher spawning flows are expected to attract more natural chinook salmon spawners, and their passage over Little Falls would be improved. The adverse effects of this license article are the continuation of the baseline environmental conditions, such as limited streamflow, that adversely affect survival and recovery that could be initiated in significantly less than two years. Significant capital facilities will require time to plan, design, and construct prior to operation. In that case, the construction timing will not reduce the functional aspects of habitat access and enhancement.

5.1.3 Article 401: Effects of the Erosion Control Plan

This license article requires filing with, and FERC approval of, a plan to control erosion, bank stability, sedimentation, turbidity, and water pollution from dike removal at the Nalley Ranch. NOAA Fisheries assumes that dike removal will open 285 acres, as described in FERC's final environmental impact statement (FEIS). NOAA Fisheries further assumes the work would occur during the low flow summer period, with borrow material moved to the borrow site and imported material in the dikes removed to upland disposal sites according to "best management practices" (BMPs) associated with construction in and near watercourses.

These BMPs should limit the adverse consequences to fish, including listed fish, from the potential harm that might be caused by these prospective land disturbing actions. Under the approved plan, dike removal activities should not reduce the functional value of habitat.

5.1.4 Article 402: Plan for controlling erosion, etc., associated with the removal of the McTaggert Creek diversion

The action of removing Tacoma Power's diversion on the upper reach of McTaggert Creek, and restoring the flow to the primary channel of McTaggert Creek instead of the present channel leading to Deer Meadow, would benefit listed chinook salmon and summer chum salmon that utilize the lower North Fork Skokomish River by augmenting streamflow, increasing the variability - or normative character and habitat function - of streamflow in both McTaggert Creek and the lower North Fork Skokomish River. This is expected to increase suitable spawning and rearing habitat for both Puget Sound chinook salmon and Hood Canal summer chum salmon, and it would also benefit adult and juvenile migration. The limited adverse effect of erosion is small compared to the streamflow improvement when measured against the survival and recovery of the listed ESUs.

5.1.5 Article 403: Plan to enhance mainstem channel conveyance capacity

An increased channel conveyance in the mainstem Skokomish River, without overbank flooding, would benefit the species migration, spawning, incubation, and rearing. Higher migration survival and successful spawning is expected during high migration flows by keeping salmon in the river channel and out of forests and fields, where some become stranded and die. Incubating eggs and rearing juveniles may experience increased survival if the greater channel conveyance reduces water velocity and its associated streambed scouring effects. The process of how this action occurs could cause harm and take to listed species if the mechanism is channel dredging, bank armoring, or dike construction. Further consultation with NOAA Fisheries on this specific action is necessary to avoid harm and reduce take to a negligible level.

5.1.6 Article 404: Plan for studying the effectiveness of maintaining mainstem channel conveyance using up to 25,000 acre-feet of water for flushing flows

The First 5 Years of the License

NOAA Fisheries assumes the release of 25,000 acre-feet of water for flushing flows would occur during the winter months, probably December and January, when high streamflow is common, with total mainstem flow not to exceed 2,500 cfs. NOAA Fisheries assumes any actions taken in this study would be coordinated with fisheries managers to avoid redd scouring and egg mortality.

Flushing flows, using up to 25,000 acre-feet of water, are to be released during the first five-year period of the license. The natural timing of such flushing flow occurrences would be during the late fall and winter in response to heavy rain or rain-on-snow events, and during the late spring and early summer due to snowmelt. The ecological value of such flow events includes the transport of fine sediments, channel maintenance, and habitat formation, and the facilitation of

upstream and downstream migration. Potential adverse effects to fish, including Puget Sound chinook salmon and Hood Canal summer chum salmon, are redd scour and loss of incubating eggs. Late fall and winter floods produce an immediate short-term effect of adversely affecting both listed ESUs.

This normal ecological process is beneficial in the long term and detrimental in the short term to salmon. More significantly, this normal process is likely critical to the species' long-term survival as it cleans gravels by transporting fine sediments downstream and reforms and creates new spawning and rearing habitats as the river channel naturally migrates within its flood plain. Spring floods due to snowmelt and runoff occurs when there are no salmon eggs still incubating in the gravel. High, overbank spring flows could transport and potentially strand rearing and migrating juveniles on the flood plain beyond the normal river channel, but the most likely effect would be the facilitation of downstream migration to Hood Canal. Natural spring floods are generally of lower magnitude and longer duration than fall and winter floods.

FERC's BA additionally indicates that such higher flows ". . . could interfere with natural reproductive efforts including mate selection, paring, and egg deposition and fertilization. High flows during these critical periods could cause delays in spawning or reproductive failure if high flows prompt salmon to spawn in areas that will be subsequently dewatered." NOAA Fisheries agrees that these effects may also occur, but believes they would be of substantially less overall adverse impact to the species than redd scour and associated egg mortality.

The proposed action is to store water in the reservoirs and divert it from the Skokomish River Basin to Powerhouse No. 2 at Potlatch. This reduces naturally occurring sediment flushing, and habitat maintaining and forming flood flows. Under the proposed action, a small proportion of the North Fork Skokomish River subbasin water will be released to create occasional flushing flows for five years.

The Remaining 35 Years of the License

The Project would store and divert this water instead of releasing flushing flows, leading to sediment accumulation in the lower river, limiting the channel maintenance and habitat forming processes. Lack of flushing flows will deprive the North Fork Skokomish River and Puget Sound chinook salmon and Hood Canal summer chum salmon of the long-term beneficial effects of this critical characteristic of the hydrologic cycle. Limiting the 25,000 acre-feet of additional water allocated to flushing flows to just the first 5 years of the license is likely to adversely affect critical habitat. Natural floods scour some incubating eggs from their gravel redds, but they are also an imperative part of the channel maintenance and habitat forming process. Providing water for just 5 years of a 40-year license is likely to reduce the restoration of salmonid habitat in the lower North Fork Skokomish River.

5.1.7 Article 405: Maintain minimum reservoir elevations in Lake Cushman

This action would harm listed species if it supercedes the minimum flow requirement downstream of Dam No. 2 by depriving listed species and their habitat of instream flows necessary to fulfill biological requirements. The amount of water that might be stored instead of released to the lower North Fork Skokomish River would vary from year to year. The quantitative effect of the action is not known. This action may reduce essential habitat function in the lower North Fork Skokomish River.

5.1.8 Article 406: Plan for monitoring reservoir elevations and streamflows

The Cushman reservoir is operated for water storage and energy generation. The full summer pool is drafted in the early autumn, coinciding with increasing energy demand in the Northwest region. This reservoir drafting results in available floodwater storage throughout the winter. The lowest reservoir water surface elevation occurs in late winter or early spring, just prior to the onset of the seasonal spring snowmelt and runoff. The spring runoff is generally sufficient to supply both energy generation needs and reservoir refill by the onset of the summer recreation season.

Fluctuations of the reservoir level may affect listed chinook salmon and summer chum salmon in several ways. The juvenile chinook salmon smolts should have migratory tendencies and behavior during the spring months. The reservoir is filling during this time period, and observations at other projects, such as Howard Hanson (Dilley and Wunderlich 1992, 1993), indicate that juvenile chinook salmon emigration declined when the pool was filling, although substantial numbers of juveniles migrated downstream both prior to and after the pool-filling operation. The fact that there is no surface, or even near-surface, exits from Cushman further exacerbates the difficulties associated with any downstream migration attempts by chinook salmon. They have come to be called resident or landlocked, but it more likely than not that residualized chinook salmon are those that did not sound 138 ft to emigrate via the penstock and powerhouse. The absence of a suitable migration pathway is what makes residualized chinook salmon landlocked.

Reservoir fluctuations affect the volume of streamflow downstream of Dam No. 2. Article 407 of the license requires a minimum stream discharge of 240 cfs, or natural flow, whichever is less. Seasonal low flows in August and September, linked to both the natural flow regime and the intentional management of the reservoir pool may adversely affect chinook salmon and summer chum salmon in the form of reduced flows for upstream migration and spawning in the lower North Fork Skokomish River.

Listed chinook salmon may be additionally affected in the Cushman reservoir. The BA indicates that reservoir drawdown may reveal passage obstructions to upstream migrating chinook salmon and that redds constructed at high pool elevations may be dewatered as drawdown progresses.

Drawdown may also dewater redds of any lake or stream mouth spawning chinook salmon, although such behavior has not been documented, nor is it expected. NOAA Fisheries agrees that these effects may occur, but believes the following is even more likely: Chinook may spawn in the main river channel in the reservoir drawdown zone. Subsequent refill prior to fry emergence would create slackwater areas above the redds, allowing the settling of fine sediment that would suffocate incubating salmon eggs or fry. This latter effect has been documented with trout redds in Ross Lake on the Skagit Hydroelectric Project (Pflug 2000).

Lake Kokanee, the reservoir behind Dam No. 2, is managed so that the water surface elevation remains near full pool. Powerhouses No. 1 and No. 2 are operated in near synchrony to minimize pool fluctuation. Any effects from fluctuation in Lake Kokanee are expected to be negligible. This action is expected to benefit listed species by providing information necessary to managing the water supply for habitat.

5.1.9 Article 407: Release minimum flow of 240 cfs, or inflow, whichever is less, to the lower North Fork Skokomish River

Increasing the minimum instream flow to 240 cfs is described in the FEIS (FERC 1996) as improving spawning, incubation, rearing, and upstream and downstream migration compared to existing conditions for all fish species, including listed chinook salmon and summer chum salmon. The effect of reducing the minimum discharge to inflow, when it is less than 240 cfs, is less clear. It is also unclear how inflow will be calculated.

The value of 240 cfs as the most suitable minimum instream flow is based on several factors. First, it is close to the calculated lowest mean monthly flow at the point of diversion. That factor does not make it suitable for habitat functions, but suggests that it approximates the naturally occurring limiting flow. Tacoma Power's consultants estimate that steelhead might pass over Little Falls at flows as low as 100 cfs, but that 200 cfs is necessary for consistent passage by chinook, coho, and sockeye salmon (Tacoma Power 1991). An Instream Flow Incremental Methodology (IFIM) study by Tacoma Power (1991) estimated peak weighted usable areas in the aggraded channel of the North Fork Skokomish River at 60 to 100 cfs. This analysis, however, overlooked the many side channels that are not watered up until higher flows occur, and are the preferred habitats for juvenile rearing by chinook salmon as well as other salmonids. Biologists from State and Federal agencies, including NOAA Fisheries, believe that spawning and rearing conditions for most species, including chinook salmon, are more closely optimized at 240 cfs. Even higher flows would benefit the degraded habitat conditions of the mainstem, but flows greater than 300 cfs would reduce juvenile rearing habitat capacity in the uppermost reach of the lower North Fork Skokomish River, due to its steeper gradient, canyon, channel morphology. As flows approach mean annual values in the canyon reach, NOAA Fisheries believes water depths and velocities exceed values most suited to juvenile rearing.

Inflows less than 240 cfs are most likely to occur during August and September (USGS 2003). Adult chinook salmon and summer chum salmon migrate into the Skokomish River during this period (FERC 1996) and begin spawning by late September. Chinook salmon passage at Little Falls at RM 15.6 is estimated to require about 200 cfs or more and may be impeded at inflows less than that.

NOAA Fisheries assumes inflows less than 240 cfs will be calculated to appropriately account for all inflow that would be present at the base of Dam No. 2 in a "without project" condition. Otherwise, chinook salmon would be deprived of critical streamflow if the North Fork Skokomish River gage at Staircase Rapids is used to represent inflow. Such an action would further deprive listed species of the water derived from that proportion of the North Fork Skokomish River subbasin not accounted for by the Staircase Rapids gage. It would also fail to account for evaporative losses at Cushman and Kokanee reservoirs which would be at their greatest during the warm months associated with the naturally occurring low flow period. NOAA Fisheries assumes the plan required in Article 406 will account for these gains and losses, and the potential adverse effects to the listed species will be avoided.

Flows diverted from the river under the license would be reduced, compared to the flow diverted historically by the Project. The proposed action is to divert about 70% of the mean annual flow out of the river, instead of the 96% diverted previously by Tacoma Power. This will benefit listed species migration, spawning, incubation, and rearing.

The original Project license did not address streamflow, and the North Fork Skokomish River was dry, except for accretion and tributary inflow, for decades. Tacoma Power began releasing 30 cfs in 1988 in an agreement with the Washington State Department of Ecology. Tacoma Power further increased the instream flow to 60 cfs in 1999. The 240 cfs specified in the license is less than one-third of the mean annual flow of the North Fork Skokomish River at Dam No. 2. Extreme low inflow occasionally drops below 70 cfs for short periods in the late summer and early autumn. Table 2 describes mean monthly flows at Staircase Rapids, adjusted to the point of diversion at Dam No. 2. The flow available for storage and out-of-basin diversion, excepting the 25,000 acre-feet for flushing flows, is also shown in Table 2.

Table 2. Mean monthly flows at Cushman Dam No. 2 and flow available for instream flow, storage, and diversion.

Month	**Flow at Staircase Rapids adjusted to Dam No. 2**	**North Fork Skokomish River Instream Flow**	**Available for Storage and Diversion***
January	1064	240	824 (77.4%)
February	984	240	744 (75.6%)
March	773	240	533 (68.9%)
April	791	240	551 (69.6%)
May	1015	240	775 (76.3%)
June	923	240	683 (74%)
July	525	240	285 (54.3%)
August	239	239	0 (0%)
September	225	225	0 (0%)
October	572	240	332 (58%)
November	1075	240	835 (77.6%)
December	1211	240	971 (80.2%)
Mean annual	784 (inc. rounding error)	238	546 (69.6%)

Source: USGS 2003.
*This does not account for up to 25,000 acre-feet for flushing flows.

Salmon require flowing water sufficient for migration, spawning, incubation, and rearing for their existence. The leakage and accretion flows during the period of the original license were not sufficient to sustain chinook salmon or summer chum salmon at any significant level, and few salmon were observed in the North Fork Skokomish River upstream of McTaggert Creek (FERC 1996). Indigenous populations may have been extirpated. Most salmon were restricted to the area of the North Fork Skokomish River downstream from McTaggert Creek, a tributary that has provided seasonal flows that could sustain some fish. McTaggert Creek's seasonal flows do not correspond to the migration and spawning requirements of summer chum salmon. The chinook salmon and normal timed chum salmon that find their way to the North Fork Skokomish River may be the result of hatchery strays, or a combination of strays and endemic wild fish. Genetic data is not available to verify the origin of these fish.

The existing instream flow condition, then, is somewhat more limiting in fish habitat availability than the worst case, temporary, natural flow condition. The average natural flow in August and

September is about 150 cfs, when flows for chinook salmon and summer chum salmon are most limiting. The average flow condition will facilitate upstream migration and spawning.

Diversion of all but 240 cfs from the North Fork Skokomish River, along with releasing up to 25,000 acre-feet of stored water for channel maintenance and flushing flows, would do much to recover most of the potential chinook salmon and summer chum salmon productivity that could be attained in the lower North Fork Skokomish River. However, in most years, the "or inflow" alternative standard would deliver less than 240 cfs during the migration and spawning periods for both fall chinook salmon and summer chum salmon.

A flow of 240 cfs, or inflow, whichever is less, is not the best streamflow regime for anadromous fish in the lower North Fork Skokomish; however, it is a reasonable minimum instream flow to restore anadromous fish production and enable the survival and recovery of listed salmon. It would better meet the needs of salmon survival and recovery if supplemented with periodic, seasonal freshets during the late summer/early fall and spring months.

5.1.10 Article 410: Water quality enhancement plan

Emergency intake shutoff valves and monitoring dissolved gases would serve to improve habitat quality for listed species by reducing the likelihood of entrainment and lead to prevention of gas supersaturation.

5.1.11 Article 411: Plan for ramping rates

The plan includes developing a defined critical flow, which is necessary to know at what point to restrict downramping rates to minimize fish stranding. The article provisionally adopts the agency-recommended downramping rates described in Hunter (1992), commonly known as the Washington State guidelines. Downramping during the respective seasons of juvenile occurrence can always be expected to occasion some juvenile mortality (Beck 1989). Observing the Washington State guidelines will result in minimal gravel bar stranding of juvenile salmon. Some fish would still be taken by pothole stranding, but not at levels that interfere with survival and recovery.

The Washington State guidelines do not address the ancillary downramping issue of flow amplitude, i.e., the diurnal swings between the highest and lowest flows. Beck (1989) found that amplitude is a significant factor influencing stranding, because amplitude determines the amount of juvenile fish habitat that is dewatered on a frequent basis. When amplitude is large relative to river flow volume, high fish mortalities are probable (NOAA Fisheries 2003; Phinney 1974). NOAA Fisheries has observed that amplitudes of 50% or less per day of the highest daily flow have coincided with stable and increasing spawning salmon populations in the upper Skagit River, downstream of the Skagit Hydroelectric Project (Beck 1989; Pflug 2000). This license article does not restrict daily amplitude, so high stranding mortalities are likely if large

amplitudes occur. They could be prevented by extending large amplitude fluctuations over several days, reducing flow by no more than 50% per day. Limiting flow fluctuations with ramping rates stabilizes fish habitat and makes it more functional and better suited to the survival and recovery of the listed species.

5.1.12 Article 412: Plan for fish habitat enhancement

The specific effects are uncertain, but in general, the effects of: 1) augmenting spawning gravel; 2) replacing the culvert at McTaggert Creek; 3) bridging the river at the Richert Farm; 4) removing migration barriers at Big Creek (and Dow Creek); 5) removing the McTaggert Creek diversion; 6) implementing habitat enhancement measures described in FEIS section 4.4.1.4 (FERC 1996); and 7) developing a schedule for implementation; would benefit listed chinook salmon and summer chum salmon by reducing the adverse Project effects of gravel sedimentation, increasing access to habitat, and increasing stream flow, which will increase the quantity and quality, and productivity and capacity of the lower North Fork Skokomish River. These actions would not appreciably reduce the likelihood of survival and recovery of listed Puget Sound chinook salmon and Hood Canal summer chum salmon.

5.1.13 Article 413: Fish habitat and population monitoring plan

The plan will acquire the information necessary to adjust the fish enhancement actions of Article 417. The expected effect is that anadromous fish, including listed chinook salmon, will be restored as rapidly as is practicable in the North Fork Skokomish River.

5.1.14 Articles 414, 415, 419: Downstream and upstream passage

License Article 414 requires the Licensee to provide downstream passage around Dams No. 1 and No. 2. License Article 415 requires the Licensee to provide upstream fish passage around Dams No. 1 and No. 2. Article 419 reserves FERC's authority to require the Licensee to provide fishways as may be prescribed by the Department of the Interior or the Department of Commerce.

The effect of passage will potentially restore habitat connectivity over the range of chinook salmon in the Skokomish River drainage to their historic upstream limit. Much of the former habitat is inundated by reservoirs now, but chinook salmon will have access to spawning and rearing habitat that has been unavailable to anadromous fish for more than 70 years. Chinook salmon that presently are entrained in penstocks or become landlocked in Lake Cushman will have improved access to and from the sea. The landlocked population is small and is genetically distant from other Skokomish and Puget Sound chinook salmon populations. This geographically and genetically isolated population could be expected to benefit from increased genetic diversity if it interbreeds with chinook salmon from the lower Skokomish River population. Conversely, there is some risk to the lower Skokomish River chinook salmon

population from interbreeding with the landlocked chinook salmon. However, the lower Skokomish River population is very large compared to the small landlocked population. Any detrimental effects should be small and heavily selected against in a more diverse environment with access to marine waters. Intermixing of chinook is expected to increase the population's genetic diversity. Overall, the naturally reproducing chinook salmon population stands to benefit from expanded range, increased population size, and increased genetic diversity.

Chum salmon are not expected to utilize the passage facilities. Chum salmon generally do not enter fish ladders, although some have used the White and Baker River adult facilities. Passage at the Project is expected to benefit listed chinook salmon, and possibly bull trout and other unlisted salmonids, such as steelhead, cutthroat trout, coho salmon, and sockeye salmon.

Development of the upstream and downstream passage facilities may result in short-term construction impacts depending on its location. The upstream passage facility can be expected to limit the amount of North Fork Skokomish River habitat available to anadromous fish. This limited amount of habitat would be small contrasted against the 4,000 acres of Lake Cushman and 2 miles of upper North Fork Skokomish River from the lake to Staircase Rapids, and potentially available habitat upstream of the rapids. No adverse effect should accrue to summer chum salmon, provided the facilities are located upstream of the lower falls, which is expected to be the upstream limit for that species.

FERC's BA mentions that existing habitat in Lake Cushman and the upper North Fork Skokomish River is suitable for chinook salmon, as evidenced by the presence of the endemic landlocked chinook salmon. The BA mentions several factors that could limit potential chinook salmon production upstream of the dams: 1) competition with existing landlocked chinook salmon and other salmonids, 2) predation on juvenile salmon by bull trout, 3) inefficiencies in the downstream passage facilities, and 4) entrainment mortality. NOAA Fisheries agrees some of these factors could influence chinook salmon productivity.

NOAA Fisheries does not see interaction with the existing landlocked chinook as competition, but rather, as the restoration of connection among the chinook salmon population. Being landlocked is not the nature of chinook salmon, and landlocked chinook likely do occur in Lake Cushman only because some portion of the juvenile chinook salmon population is unable to successfully migrate through Lake Cushman and sound 138 ft to find the entrance to the turbine penstocks. These fish then grow and mature in the reservoir, eventually spawning in the upper North Fork Skokomish River.

Interspecies and within-species predation is common among fish populations, especially salmonids. Bull trout and other salmonids evolved in sympatry, and there are numerous river basins in the Pacific Northwest where bull trout and chinook salmon coexist. Bull trout and chinook salmon both presently occur in the South Fork Skokomish River, Lake Cushman, and the North Fork Skokomish River. Restoring upstream and downstream habitat connectivity in

the North Fork Skokomish River is not expected to result in any unnatural or unusual interspecies interactions between bull trout and chinook salmon that do not already exist, other than restoring the capacity for fewer impeded migrations.

Downstream passage will not completely mitigate for the effect of the dams as barriers to migration. Nonetheless, NOAA Fisheries anticipates an increase in overall chinook salmon production in response to increased habitat capacity and a marked reduction in mortality presently attributable to entrainment. Entrainment should be greatly reduced by the presence of downstream passage facilities. The facilities should include a barrier to prevent the occurrence of most entrainment, and the passage facility, in the form of a floating surface collector, should have NOAA Fisheries' criteria screens, which would eliminate entrainment at that point. Some juvenile fish may be lost to downstream transport, but the expected loss is less than 2%, based on facilities meeting NOAA Fisheries' screen and fishway criteria (Serl 2003)

Downstream fish passage facilities are the most significant component in restoring fish habitat connectivity between the upper North Fork Skokomish River and the rest of the basin and Hood Canal. Downstream passage facilities are not expected to have perfect efficiency, either in attraction, collection, or transport; however, the net effect of effective fish passage is expected to greatly reduce the impact of the Project as a barrier to migration by increasing habitat capacity, chinook salmon production, and genetic diversity.

The downstream passage facilities have not been designed. NOAA Fisheries' analysis assumes the development and operation of a modern version of a floating surface collector, with 500 cfs or more attraction flow, a reservoir-to-collector transition structure, and a barrier net to prevent entrainment and to guide fish to the floating collector. A downstream passage facility using this design concept is NOAA Fisheries' present estimation of what is necessary to achieve passage efficiencies that yield self-sustaining fish populations.

Upstream passage facilities would most likely be a form of trap and haul, given the layout of the Cushman dams and reservoirs. NOAA Fisheries assumes a passage facility comparable to, but more updated than, those at Baker, Wynoochee, and White Rivers. A modern facility, with improved screening and sorting facilities, is expected to successfully pass adult fish with a survival rate of 98% or better, based on observations at Baker, White, and Cowlitz Rivers. A potential adverse effect of upstream passage facilities is that stray fish from other points of origin may enter the fish trap and be transported to Lake Cushman. This potential exists at all such facilities because straying by a small part of salmon and steelhead populations is normal to their behavior. Conversely, Cushman fish may stray to other locations. The net effect is expected to be near neutral.

Article 419 reserves FERC's authority to require fishways as may be prescribed by the Secretaries of the Departments of the Interior and Commerce. The effect of this portion of the

article will benefit listed chinook salmon by ensuring that fishways are developed that meet NOAA Fisheries' fishway criteria and performance standards.

5.1.15 Article 416: Monitoring fish passage facilities

Monitoring the use of fish passage facilities involves sampling fish, which usually has some associated mortality. Monitoring is necessary to ensure that fish passage facilities are operating as expected and are not resulting in unexpected injury or mortality. This is common at many hydroelectric facilities, and the observed mortality rate is typically less than 1%, although it has been higher, depending on the nature and extent of fish handling involved, as well as the fish species being handled. Mortalities are minimized by reducing the amount of handling of fish. NOAA Fisheries expects the adverse effect of this article to be less than 1%. This slight mortality is much less than the higher mortality rates that could occur as a result of failure to monitor passage facilities.

5.1.16 Article 417: Fish restoration plan

This article provides for anadromous fish restoration through hatchery supplementation to establish naturally reproducing populations where possible and for stocking the lower North Fork Skokomish River and Lake Cushman, in consultation with NOAA Fisheries and the other fisheries agencies and the Skokomish Indian Tribe. The Licensee is to provide up to $3,600,000 for capital expenditure and $271,000 annually for operation and maintenance (in 1998 dollars) for the license term. The intended fish species are chinook salmon, coho salmon, sockeye salmon, and steelhead.

Anadromous fish populations can be expected to expand gradually once increased streamflow is released into the lower North Fork Skokomish River and fish passage facilities are constructed and operating. However, that expansion would occur much more rapidly by providing the hatchery supplementation contemplated in this license article. The chinook salmon population increase could be accelerated by the artificial production of juvenile fish to release upstream of the dams, so that more adult chinook salmon would seek to return to the upper North Fork Skokomish River. The actions contemplated for this plan are general, not specific. A primary sponsor, or sponsors, need to be named to coordinate this work with NOAA Fisheries under a Hatchery and Genetics Management Plan (HGMP) under Section 10 of the ESA.

A second part of the program envisioned by this article would stock resident fish to enhance recreational fishing in Lake Cushman and Lake Kokanee. One and one-half million kokanee fry would be stocked annually in Lake Cushman. NOAA Fisheries does not expect this to conflict with chinook salmon recovery in the upper North Fork Skokomish River, although it would appear somewhat redundant when implemented concurrently with a sockeye salmon program that would have many of the same effects as the kokanee program. Chinook salmon and kokanee are expected to differentially partition habitat utilization in the Skokomish River Basin.

This second program part also includes stocking 140,000 catchable sea-run cutthroat trout annually in Lake Cushman. This program segment is vague beyond this single detail. Nonetheless, NOAA Fisheries is concerned that the number of sea-run cutthroat trout is large, and that cutthroat trout larger than about three fish per pound may prey on juvenile chinook salmon. Trout stocking and predation studies on the Cowlitz River at Cowlitz Falls Dam indicate that larger stocked catchable rainbow trout (two fish per pound) prey on juvenile chinook salmon and other salmonids. NOAA Fisheries is concerned that cutthroat trout may become piscivorous at a slightly smaller size than rainbow trout, but these are traits that depend on particular fish stocks and environment along with fish size. Therefore, NOAA Fisheries cannot accurately predict the outcome, but believes the risk warrants consideration, and that perhaps fewer cutthroat trout should be stocked, or a specific stocking strategy be employed to avoid or reduce predation effects.

This second program part also includes stocking 12,000 catchable rainbow trout in Lake Kokanee. This is a large number of fish to stock in a 100-acre reservoir, but NOAA Fisheries expects less predation from the rainbow trout, particularly if they are no larger than three fish per pound in size. Furthermore, the downstream fish passage facilities, combined with a barrier net in Lake Cushman, should minimize the entrainment of juvenile fish, including chinook salmon, into Lake Kokanee.

Requiring the development and implementation of this plan in close coordination with NOAA Fisheries and the other fisheries agencies, the Skokomish Indian Tribe, and FERC, could be an adaptive management approach that optimizes the species and fisheries benefits of this license article while avoiding and minimizing the potential adverse effects. Specific actions in this broad article might adversely affect survival and recovery, but the net effect, particularly if the necessary agency consultation occurs, would be to facilitate survival and recovery for listed species and restoration and enhancement of unlisted species.

5.1.17 Article 418: False attraction at Potlatch powerhouse

This article requires a plan to monitor the effects of false attraction to Project outflow at Powerhouse No. 2 at Potlatch. Dam No. 2 receives and impounds water from the North Fork Skokomish River and routes it out-of-basin through a flowline and penstocks directly to Powerhouse No. 2, unmixed with the South Fork or mainstem Skokomish River waters. Anecdotal information indicates that salmon are attracted to discharge at Potlatch, but there is no conclusive information regarding whether fish are significantly delayed as a result of any false attraction or the effects of any delay that may occur. The stated purpose of the plan is to determine the need for any additional measures to protect fish as a result of any false attraction and delay. The article requires the Licensee to consult with NOAA Fisheries and the other fisheries agencies and the Skokomish Indian Tribe, and reserves FERC's authority to require structural and operational changes, if necessary, to protect fish.

NOAA Fisheries believes the problems associated with false attraction are likely to increase over time, as fish populations of the North Fork Skokomish River increase. There will be many more fish available to experience the effects of false attraction to discharge water that is exclusively from the North Fork Skokomish River. The article requires the Licensee to develop the plan within 180 days of license issuance. The potential adverse effect on listed chinook salmon could be considerable if the plan implements a study only before the population in the North Fork Skokomish River increases significantly. A plan requiring investigation, both near term, and again after North Fork Skokomish River populations experience a significant increase, would better inform FERC of any prospective need for additional fish protection measures, reducing potential adverse effects on listed Puget Sound chinook salmon and Hood Canal summer chum salmon.

5.1.18 Article 422: Estuarine Enhancement Plan

License Article 422 requires an Estuarine Enhancement Plan that includes dike removal and reestablishment of tidal channels at the Nalley Ranch, and an assessment of, and possible augmentation of, large woody debris in the Skokomish River estuary. Estuarine habitat is critical to the growth and development of Puget Sound chinook salmon and Hood Canal summer chum salmon.

Improvements at Dow Creek, a tributary of Lake Kokanee, should be neutral in effect on the listed salmon species. Improvements at Big Creek may benefit chinook salmon, possibly by making spawning habitat more accessible, but more likely by making rearing habitat more accessible to juvenile chinook salmon. The remaining measures are more likely than not to improve the quality and quantity of chinook salmon and summer chum salmon habitat in the North Fork and mainstem Skokomish River. The estuarine plan and specific projects are as yet undeveloped, so a specific assessment is not possible. Structural projects and inwater construction work can be expected to have at least short-term adverse habitat effects or direct effects on fish, depending on the timing and nature of the work. With timing and construction practices subject to consultation with NOAA Fisheries and the other fisheries agencies and Skokomish Indian Tribe, the adverse effects can be avoided or minimized to a negligible level.

5.1.19 Article 423: Threatened and Endangered Species Protection Plan

This article provides for a plan to protect listed species such as peregrine falcon, bald eagle, marbled murrelet, and spotted owl during Project construction and operation. It is not apparent that it would adversely affect listed chinook salmon and summer chum salmon. However, since this license order predates the listing of the salmon species, it would be beneficial to include chinook salmon and summer chum salmon as listed species to also be protected during Project construction and operation, since their protection is the subject of this consultation.

5.1.20 Article 425: Recreational Resources Plan

This plan intends the improvement of recreational amenities at Lake Cushman and access facilities. Improved recreational access could coincide with increased access to, harm to, and take of, listed species, primarily chinook salmon in Lake Cushman and the upper North Fork Skokomish River. The consultation provided for in this article does not include NOAA Fisheries. NOAA Fisheries cannot predict that adverse impacts to listed salmon will be avoided or minimized during execution of actions contemplated by it.

5.2 Summary of Project Effects

The direct effects of FERC's prospective action of licensing the Project include primarily positive long-term effects and some negative, mostly temporary, effects. The negative effects adversely affect listed Puget Sound chinook salmon and Hood Canal summer chum salmon, but the effects do not rise to the level of appreciably affecting the survival and recovery of these ESUs. The positive effects are likely to restore significant population elements within the North Fork Skokomish River Basin, which may contribute significantly to the recovery of the these ESUs. The effects of the license article actions are summarized in Table 3.

Table 3. Analysis of Project Effects. Summary of effects of proposed action on North Fork Skokomish River listed salmonids. IMPAIR = impair properly functioning habitat; REDUCE = appreciably reduce the functioning of already impaired habitat; RETARD = retard the long-term progress of impaired habitat towards properly functioning condition; NR = not reduce, retard, or impair; NPF = baseline not properly functioning; AR = baseline at risk; PFC = baseline properly functioning conditioning.

Project Feature	**Effects**	**Effect Pathway/ Indicator**	**Baseline Status**	**Effect of Proposed Action**	**License Article**
Cushman Dams No. 1 & 2	Reservoirs effect on lower North Fork	Water Quality/Temperature	NPF	NR	410
Cushman Dams No. 1 & 2	Upstream and downstream migration barriers	Access/Barriers	NPF	Short term: Reduce Long term: NR	414, 415, 416, 419
Cushman Dams No. 1 & 2	Entrainment of juveniles into turbines	Access/Barriers	NPF	NR	414, 416, 419
Cushman Dam No. 2	Impacts of disrupting sediment transport in North Fork Canyon and mainstem	Elements/Substrate	NPF	NR	412, 413
Cushman Dams No. 1 & 2	Transport of LWD blocked by dams.	Elements/LWD	NPF	NR	412, 413
Cushman Dam No. 2	Water diversion dewaters river	Elements/Off-channel habitat	NPF	NR: North Fork Reduce: mainstem	405, 406, 407
Cushman Dam No. 2	Water diversion dewaters river and simplified channel complexity	Elements/Refugia	NPF	NR	405, 406, 407
Cushman Dams No. 1 & 2	Disconnected N. Fork; lacks complexity in mainstem	Channel dynamics/Channel morphology	NPF	NR	403, 404,405, 406, 407
Cushman Dam No. 2	Dikes in Estuary and dewatered stream	Channel dynamics/flood plain connectivity	NPF	NR	422

Cushman Dam No. 2	Water diversion dewaters river	Channel dynamics/Altered flows	NPF	NR	403, 404,405, 406, 407
Acquire wildlife lands	Manage land for habitat value	Water quality/ sediment Channel dynamics/ bank condition	NPF	NR	204
Construction timing	Timing of beneficial actions	Access/barriers; Elements/ substrate, LWD	NPF	NR	301
Erosion plan	Limit erosion	Water quality/ sediment	NPF	NR	401, 402
Ramping rate plan	Limit streamflow fluctuation	Elements/habitat stability Channel dynamics/flow fluctuation	NPF	NR	411
Fish restoration plan	Restore and enhance fish populations	Not a habitat pathway or indicator	NPF	NR	417
Potlatch false attraction study	Assess and respond to fish migration delay	Access/barriers	NPF	NR	418
T & E species plan	Protect T&E species	Not a habitat pathway or indicator	NPF	NR	423
Recreational resources plan	Enhance recreation	Not a habitat pathway or indicator	NPF	Reduce	425

6. CUMULATIVE EFFECTS

Cumulative effects are defined in 50 CFR §402.02 as "those effects of future State or private activities, not involving Federal Activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." As step 4 of this analysis, cumulative effects for the general action area are considered. Future Federal actions, including the ongoing operation of hatcheries, fisheries, and land management activities are not considered within the category of cumulative effects for ESA purposes because they require separate consultations pursuant to Section 7 of the ESA after which they are considered part of the environmental baseline.

NOAA Fisheries evaluated many actions to determine whether or not they would meet the requirements of its implementing regulations. Those actions which are most notable include State laws that influence future development or land management activities in the action area (Washington Forest Practices Act including the Shoreline Management Act, Growth Management Act, and Hydraulics Code, and recent legislation to enhance salmon recovery through tributary enhancement programs, among others); TMDL (total maximum daily load) development and implementation; recent human population trends in the action area, as well as unauthorized land use and management activities (e.g., poaching, chemical spills and applications; and hydraulic modifications to tributaries (riparian clearing, diking, and adding impervious surfaces). However, after considerable review, NOAA Fisheries has determined that these actions cannot be deemed reasonably likely to occur based on its ESA implementing regulations.

The Endangered Species Consultation Handbook describes this standard as follows:

> "Indicators of actions 'reasonably certain to occur' may include, but are not limited to: approval of the action by State, tribal or local agencies or governments (e.g., permits, grants); indications by State, tribal or local agencies or governments that granting authority for the action is imminent; project sponsors' assurance the action will proceed; obligation of venture capital; or initiation of contracts. The more State, tribal or local administrative discretion remaining to be exercised before a proposed non-Federal action can proceed, the less there is a reasonable certainty the project will be authorized."

There are, of course, numerous non-Federal activities that have occurred in the action area in the past, which have contributed to both the adverse and positive effects of the environmental baseline. This step of the analysis for application of the ESA Section 7(a)(2) standards requires the consideration of which of those past activities are "reasonably certain to occur" in the future within the action area.

First, any of these actions that involve Federal approval, funding, or other involvement are not considered "cumulative effects" for this analysis (see ESA definition, above). This Federal involvement will trigger ESA Section 7(a)(2) consultation in the future. Once the consultation on those actions is completed, the effects may be considered part of the environmental baseline, consistent with the ESA regulatory definition of "effects of the action" (50 CFR §402.02).

Next, actions that do not involve Federal activities must meet the "reasonably certain to occur" test for NOAA Fisheries to consider their effects in this Opinion. In reviewing the actions identified above and after eliminating from consideration those with Federal involvement, NOAA Fisheries finds that currently few, if any, of the future adverse or beneficial State, tribal or private actions qualify for consideration in this analysis as "cumulative effects."

Therefore, when evaluating the status of the ESA-listed species, including their likelihood of survival and recovery, NOAA Fisheries concludes that most of the factors for the decline of these species are not eligible for consideration in determining whether the future operation of the Project under the proposed license is likely to jeopardize their continued existence. Thus the future abundance and productivity of the listed Puget Sound chinook salmon and Hood Canal summer chum salmon, against which the effects of this action are considered, are likely to be improved, although to an unknown or possibly minor extent, over those reflected by the historical trends under the environmental baseline.

7. CONCLUSIONS

This section presents NOAA Fisheries' biological opinion regarding whether the aggregate effects of the factors analyzed under the environmental baseline (Section 4), effects of the proposed action (Section 5), and the cumulative effects (Section 6) in the action area, when viewed against the current rangewide status of the species (Section 3), are likely to jeopardize the continued existence of Puget Sound chinook salmon or Hood Canal summer chum salmon. To "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (CFR §402.02).

As determined in Section 3, the status of the listed ESUs is characterized by low abundance and downward population growth rates, despite recent encouraging adult returns. Were NOAA Fisheries to simply project this status forward over the term of this proposed license, it is unlikely that the environmental conditions would allow the affected ESUs to survive with an adequate potential for recovery. Additionally, as determined in Section 4, the habitat biological requirements of the affected ESUs are not currently being met. However, some adverse effects of the environmental baseline, while responsible for this current status, cannot be assumed to continue into the future over the term of the proposed license. This is because few Federal actions that contribute to the current status under the environmental baseline have completed ESA Section 7 consultation for more than the next few years. Thus NOAA Fisheries can assume that the current status will improve, although to an unknown or possibly minor extent, as natural processes (e.g., recovery of riparian vegetation removed as a result of past timber harvest activities) reduce the continuing effects of the environmental baseline. As determined in Section 6, there are few, if any, State or private projects that meet the ESA definition of "reasonably certain to occur" and therefore their effects cannot be assumed for this analysis.

NOAA Fisheries finds that the proposed action, while resulting in some short-term negative effects, will likely result in the biological requirements of Puget Sound chinook salmon and Hood Canal summer chum salmon being met within the action area. This determination is based on a variety of factors including:

- Although lack of passage is a significant adverse effect that will continue for up to four years, neither ESU is expected to go extinct during this period. Once upstream and downstream passage facilities are constructed, NOAA Fisheries concludes that adequate passage will occur, such that the Project will not appreciably reduce the ability of juveniles and adults to migrate through the North Fork Skokomish River (see Section 5.1.14).

- Although the Project will continue to divert the majority of the instream flow during most months, NOAA Fisheries has determined that the proposed minimum flow of 240 cfs is sufficient to maintain adequate adult migration, holding, spawning, egg incubation, juvenile rearing and migration conditions, and water quality.

- Additional license measures will improve habitat quality by augmenting gravel, adding large woody debris, restoring estuarine habitat, and supplementing fish production through enhancement efforts. These measures are expected to contribute to an appreciable increase in habitat productivity and capacity for listed chinook salmon and summer chum salmon.

- In addition to not appreciably reducing the habitat requirements of listed species, the proposed action represents a reduction in the historical adverse effects of this Project, which should improve the current status of listed ESUs in the action area through the term of the license.

Based on these considerations, NOAA Fisheries concludes that the proposed action, FERC's issuance of a license for the Cushman Hydroelectric Project as described in Section 2, is not likely to jeopardize the continued existence of ESA-listed Puget Sound chinook salmon or Hood Canal summer chum salmon. Although no critical habitat is currently designated for these species, NOAA Fisheries' analysis and no-jeopardy determinations are likely to be highly relevant for the consideration of the Project's effects on habitat should any be designated as critical for these species during the term of license.

8. INCIDENTAL TAKE STATEMENT

Sections 4(d) and 9 of the ESA prohibit any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of listed species without a specific permit or exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as spawning, rearing, feeding, and migrating (50 CFR §222.102; 64 FR 60727). Incidental take is take of listed animal species that results from, but is not the purpose of, the Federal agency or the Applicant carrying out an otherwise lawful activity. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

8.1 Amount or Extent of Take

This incidental take statement is for the proposed action to license the Cushman Hydroelectric Project (FERC No. 460), under the terms and conditions of the license order of July 30, 1998. No incidental take statement is issued for the annual license, or for actions other than those of the license order of July 30, 1998.

NOAA Fisheries anticipates that incidental take of Puget Sound chinook salmon could result from Project activities as described in this Opinion. Despite the use of the best scientific and commercial data available, NOAA Fisheries cannot estimate a specific amount of incidental take of individual fish or incubating eggs. However, the mechanisms of expected effects are explained below. The extent to which these mechanisms can result in effects on salmon or salmon habitat can be described qualitatively, enabling reinitiation of consultation if such effects are exceeded during the term of the Project license.

NOAA Fisheries believes there are several ways and means by which take may occur. Direct harm may occur during the course of the Project operation, adjusting instream flows, operating fish passage systems, and other activities. These actions would result in take in the form of false attraction at Potlatch, flow fluctuations and redd and fish stranding in the North Fork Skokomish River, habitat reduction due to the continued presence of the Project, and entrainment due to expected fish passage inefficiencies. Short-term construction impacts that may take small numbers of juvenile fish or reduce habitat utilization by blockage or sediment release are also expected from prospective construction actions.

Direct take of juvenile chinook salmon by entrainment at both Dams No. 1 and No. 2 is expected to continue until a barrier, as a part of the downstream fishway, is installed and operated at Dam. No.1. This statement covers incidental take that occurs after a barrier, in consultation with NOAA Fisheries, is installed and operating.

8.2 Effect of Take

As analyzed in this Opinion and described in Section 5, and with implementation of the reasonable and prudent measure in Section 9, NOAA Fisheries has determined that the extent of anticipated take from the proposed action of the license order of July 30, 1998, is not likely to result in jeopardy to the species' survival and recovery.

9. REASONABLE AND PRUDENT MEASURES

Reasonable and prudent measures and implementing terms and conditions are non-discretionary measures to minimize take, which are not already part of the description of the proposed action. They must be implemented as binding conditions for the exemption in Section 7(a)(2) to apply. FERC has the continuing duty to regulate the activities covered in this incidental take statement. If FERC fails to require the Applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the license, or fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of Section 7(o)(2) may lapse. NOAA Fisheries believes that activities carried out in a manner consistent with these reasonable and prudent measures, except those otherwise identified, will not necessitate further site-specific consultation. Activities which do not comply with all relevant reasonable and prudent measures will require further consultation.

NOAA Fisheries believes that the following terms and conditions are necessary and appropriate to minimize take of the listed Puget Sound chinook salmon and Hood Canal summer chum salmon resulting from implementation of the action.

1. Require the Licensee to release a minimum instream flow of 240 cfs, or natural inflow at the point of Dam No. 2.

2. Require an annual water budget of up to 25,000 acre-feet for sediment flushing, channel maintenance, and habitat forming processes in the lower North Fork Skokomish River, as generally described in Articles 404 and 407, for the term of the license.

3. Require the Licensee to provide upstream and downstream passage as generally described in Articles 414 and 415, and subsequent prescriptive fishways under the reserved authority of Article 419. Passage facilities must conform to NOAA Fisheries criteria and performance standards.

4. Require the Licensee to provide the fish enhancement programs generally described in Article 417. Sponsors of the fish enhancement programs need to be designated, and they must consult with NOAA Fisheries under Section 10 of the ESA and develop HGMPs for the hatchery actions.

5. Require the Licensee to limit daily amplitude downramp to no more than 50% of maximum flow.

6. Require the Licensee to monitor the effects of false attraction at Potlatch tailrace and make any necessary structural and operational modifications necessary to protect listed chinook salmon and summer chum from the effects of delay or injury as described in Article 418.

7. Require the Licensee to perform the estuarine improvements generally described in Article 412.

8. Require the Licensee to minimize take of listed species associated with inwater work (through appropriate timing restrictions and construction practices) as the physical structures and facilities are developed. This work should further require that:

    a. Spill control equipment shall be on site and in quantities sufficient to effectively contain and recover accidental release of chemicals in the Project site.
    b. Personnel shall be familiar with spill control equipment operation and procedures prior to the initiation of work.
    c. Instream work shall be conducted consistent with WDFW's Hydraulic Code by conforming to a Hydraulic Project Approval from WDFW.

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of threatened and endangered species. Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on listed species, to minimize or avoid adverse modification of critical habitat, or to develop additional information. NOAA Fisheries has no conservation recommendations to make at this time.

10. REINITIATION OF CONSULTATION

As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded, 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion, 3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion, or 4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

NOAA Fisheries, in consultation with FERC, worked to facilitate issuance of a new license for the Project, and to finally resolve resource-related issues pertaining to the new license. FERC's FEIS and subsequent BA describe the proposed license order and license articles for the Project. In the event that the final license fails to incorporate the requirements of the agreement analyzed in this Opinion, FERC may be required to reinitiate consultation under Section 7 of the ESA.

11. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

11.1 Background

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2)); NOAA Fisheries must provide conservation recommendations for any Federal or State action that would adversely affect EFH (§305(b)(4)(A)); Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (§305(b)(4)(B)).

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting this definition of EFH: "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include aquatic areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR §600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey or reduction in species fecundity), or site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR §600.810).

EFH consultation with NOAA Fisheries is required regarding any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH.

11.2 Identification of EFH

Pursuant to the MSA, the Pacific Fisheries Management Council (PFMC) has designated EFH for three species of Federally-managed Pacific salmon: chinook (*Oncorhynchus tshawytscha*); coho (*O. kisutch*); and Puget Sound pink salmon (*O. gorbuscha*) (PFMC 1999). Take of these species, chinook salmon and coho salmon, are affected by the proposed action. Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable manmade barriers (as identified by the PFMC 1999), and long-standing, naturally impassable barriers (i.e., natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based, in part, on this information.

11.3 Proposed Actions

The proposed action and action area are detailed in this Opinion. The action area includes habitats that have been designated as EFH for various life-history stages of coho salmon and chinook salmon.

11.4 Potential Effects of the Proposed Action on Salmonids

- Acquire wildlife lands.
- Construction timing.
- Erosion plans and control.
- Enhance channel conveyance.
- Minimum streamflow and reservoir elevation.
- Ramping rate plan.
- Habitat enhancement, monitoring enhancement, and fish populations.
- Fish passage facilities and monitoring.
- Fish restoration plan.
- Potlatch false attraction study.
- Estuarine enhancement plan.

11.5 Conclusion

NOAA Fisheries concludes that the proposed action would adversely affect designated EFH for coho salmon and chinook salmon.

11.6 EFH Conservation Recommendations

Pursuant to Section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations to Federal agencies regarding actions which may adversely affect EFH. While NOAA Fisheries understands that the conservation measures described in the BA will be implemented by FERC and, through its license, Tacoma Power, it does not believe that these measures are sufficient to address the adverse impacts to EFH described above. However, the Terms and Conditions outlined in Section 9 are generally applicable to designated EFH for coho salmon and chinook salmon, and address these adverse effects. Consequently, NOAA Fisheries recommends that they be adopted as EFH conservation measures.

11.7 Statutory Response Requirement

Pursuant to the MSA (§305(b)(4)(B)) and 50 CFR §600.920(j), Federal agencies are required to provide a detailed written response to NOAA Fisheries' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

11.8 Supplemental Consultation

FERC must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR §600.920(k)).

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APPENDIX A

Matrix of Pathways and Indicators

Pathway	Indicator	Baseline Function	Description	Source
Water quality	Temp.	NPF	Reservoir effect on lower North Fork Skokomish River	Storage & diversion at Cushman Dams No. 1 & No. 2
	Sediment/ turbidity	NPF	South Fork & mainstem Skokomish River	Logging and roadbuilding
	Contami-nation	F	None noted	
Access	Barriers	NPF	Lower and upper North Fork Skokomish River	Low flows from dams and blocked access
Elements	Substrate	NPF	Sand & fines in mainstem; armored in N.Fork canyon	Logging; Dam No. 2
	LWD	NPF	Transport blocked by dams. Harvest in riparian zones for S.Fork	Dams No. 1 & 2, Logging.
	Pool freq./ quality	NPF	S. Fork & mainstem processes altered by lack of LWD, mass wasting sedimentation.	Logging, road building
	Pool freq./ quality	F	N. Fork	In park & unaffected by project
	Off-channel habitat	NPF	N. Fork, insufficient flow	Dam No. 2 dewaters river
	Refugia	NPF	Lack of LWD and channel complexity, & flow in N. Fork	Logging, road building, flow
Channel dynamics	Channel morph-ology	NPF	Disconnected N. Fork; lacks complexity in S. Fork & mainstem	Dams No. 1 & 2; logging, dikes
	bank cond.	NPF	S. Fork & mainstem	Logging

	flood plain connectiv-ity	NPF	Disconnect on mainstem and N. Fork	Dikes on main-stem; dewatered below Dam No. 2
	Altered flows	NPF	N. Fork	dewatered by Dam No. 2
Water-shed condi-tions	Increase in drainage network	NPF	Extensive logging road network, S. Fork	Logging
	Road density & location	NPF	Network of unpaved roads in S. Fork watershed	Logging
	Disturb-ance history	NPF	High disturbance in S. Fork & mainstem	Logging, agriculture
	Riparian reserves	F/ NPF	Late successional stage limited to upper N. Fork/ few or none in S. Fork or mainstem	National Park/ Logging, agriculture, rural development

Function codes: F = functioning; NPF = not properly functioning; AR = at risk.